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Dyeing Cops, Packages or Beams

Are We Dyeing in the Right Way?—Costs Compared

By W. A. FENTENER VAN VLISSINGEN

THE question of which of these ways of dyeing can best be recommended is partly a matter of technical possibilities and partly a matter of costs.

To begin with the technical side, the merits of the three systems are not equal and they differ with various classes of colors. For instance, to produce uni-colored warps of perfect uniformity, the beam-dyer has to face the problem of dyeing the beams of one set exactly to the same shade. Although this requires skillful dyeing, it is quite possible to do it. But if for the same purpose the yarn would have to be dyed in packages, it would be impossible to obtain a perfectly level warp, for no matter how carefully packages are dyed, they always show a somewhat deeper shade at the outside and, if in the course of subsequent warping an emptied package is replaced by a fresh one, the difference is bound to show up. When dyeing beams, however, the outward layers will be somewhat deeper in shade, it is true, but these are run off simultaneously on the slasher-sizer and consequently no variation in shade becomes perceptible.

On the other hand, dark indigo shades cannot be dyed satisfactorily on beams and for this class of work cop-dyeing may best be resorted to. Basic colors may quite well be dyed on packages and on cops, but when dyed on beams the difference between the inner and the outer layers becomes too great for most practical purposes.

Naphtol colors, when dyed on cops, will seldom be sufficiently fast to crocking, because in the case of cop-dyeing the intermediate hydro-extracting is impracticable. But when dyed in the package or beam form a properly adapted process will give satisfactory results.

It will be seen from what precedes, that the choice between the three forms of dyeing depends sometimes from the peculiarities of the colors used. But in the vast majority of cases the management is entirely free in its choice and it is then the consideration of costs which is of primary importance.

The costing side of the question is an intricate one, for it is ruled by a great number of factors, which may vary either occasionally or constantly. To state a striking instance, cop-dyeing has in later years become more and more unpopular on account of the large percentage of waste it produces. But with cotton at today's prices, re-examination of this objection is imperative in order to see how far it holds good. As fine yarns are more expensive than coarse yarns, it might be expected that the waste factor weighs more heavily in the case of fine yarns. It probably does. But this factor is counteracted by the factor of winding costs, which would tend to make cop-dyeing more attractive in the case of fine counts. We will probably find that taking a certain waste-percentage and a certain yarn price-list for granted, cop-dyeing becomes profitable from a certain count of yarn upward.

It is important for any mill-management to know where this limit lies. But it should be borne in mind that this limit is not a fixed one, for it varies not only with the price of cotton yarn, but it varies from mill to mill and even from case to case. For instance, if a given quantity of a certain color has to be dyed, it may occur that this quantity may be dyed in two batches if dyed in package-form, and in three batches if dyed in cop-form. In this case the expenditure in labor, water, steam and power necessary for dyeing one batch occurs two times if packages are dyed, against three times if the dyeing is done in cop-form. This no doubt enhances the price of cop-dyeing for this particular case and it is possible that this drawback is not compensated by other factors.

Again, if we have to dye 100 pounds of yarn for a solid colored warp of 3,000 ends, this means that, if a 600 ends warper is available, the system of beam-dyeing would involve the dyeing of 5 beams. Now, if our plant possesses only single beam dyeing machines, this means that the cost of dyeing one beam occurs as often as five times. Here beam-dyeing is obviously at a disadvantage as far as the dyeing itself is concerned, and a compilation of all the different cost factors must be made to see whether beam-dyeing is still justifiable in this case.

It will be seen from these few instances, that the problem is a very complex one and that it cannot be settled according to a general rule. Nevertheless, big lots of money are at stake and one would be desirous to see, that in every particular case the "one best way" should be chosen.

To serve this end the writer will endeavor to compress all the various cost factors into a few concise diagrams. With the aid of these it will be possible to ascertain in a minute's time which way of production is best suited to every case.

To get a clear survey, the various operations and the main sources of waste, which form part of each method of production, are enumerated below:

Beam Dyeing for Warp
Winding from cops to cones
(Winding waste)
Warping in the grey state
(Warping waste)
Dyeing
Package Dyeing for Warp
Winding from cops to packages
(Winding waste)
Loading of carriers
Drying
Unloading of carriers
Hydro-extracting
Drying
(Dye-plant waste)
Warping
(Warping waste)
Partly rewinding and redyeing of remnants
Cop Dyeing for Warp
Skewering
Dyeing
Stripping
Drying
(Dye-plant waste)
Winding to cheeses
(Winding waste)
Warping
(Warping waste)
Partly rewinding and redyeing of remnants
Beam Dyeing for Weft
Winding from cops to cones
(Winding waste)
Warping in the grey state
(Warping waste)
Dyeing
Winding from beams to pirns
(Pirning waste)
Package Dyeing for Weft
Winding from cops to packages
(Winding waste)
Loading of carriers
Hydro-extracting
Drying
(Dye-plant waste)
Rewinding to pirns
(Rewinding waste)
Cop Dyeing for Weft
Skewering
Dyeing
Stripping
Drying
(Dye-plant waste)
Rewinding to pirns
(Rewinding waste)

We will now show how cost diagrams may be elaborated for each of these six production methods.

For this purpose it may, or it may not, be right to leave the overhead expenses out of the question. If, owing to shortage of work, each department has part of its plant laying idle, no increase of overhead charges will be caused by shifting a certain part of the work from one department to another. Under such conditions it is not only useless, but it may be actually misleading to let overhead expenses influence the decision.

But if shifting work from one department to another would necessitate an extension of plant, the increase in overhead charges which would be the consequence must be taken into due account. In this case the correct way is to calculate the increase in overhead expenses separately and to see how the marginal cases would work out, if they had to carry this increase by themselves. If no profit is left, this goes to prove that the extension does not pay.

The figures given below have illustrative value only, as the actual figures naturally vary from mill to mill and have to be separately established in every individual case.

We will now consider:

Beam Dyeing for Warp. For the sake of convenience we take the cost of dyeing first. This process entails two groups of costs, which from the point of view of costing are essentially different. The first group, comprising dyestuffs and chemicals, varies in accordance with the weight of the batches dyed. The other group, consisting of wages, power, steam and water, remains practically unchanged, no matter what weight the batches have, as long as one and the same capacity of machine is used.

The amount of dyestuffs and chemicals consumed is scarcely affected by the form in which the yarn is dyed, as long as this is done in a machine of given capacity, but it may be greatly influenced by side-issues, such as whether a standing bath happens to be available for a certain shade or not. However, circumstances like these cannot be laid down in a diagram, especially as they have a different influence for every individual shade. Consequently the best plan is to leave the cost of dyestuffs and chemicals out of the comparison and let the dyeworks manager single out the cases in which he has a reason to advocate the dyeing in a special form.

The expenditure on wages, power, steam and water, while scarcely influenced by the weight of the batch, is different for different classes of colors. It should be ascertained how much of every item is spent in the average on one batch and the total cost figured out.

For instance, we may find the following expenditures for the dyeing of one beam:

a. With Direct or Sulfur Colors—

Wages: (dissolving dyestuffs, preparing the bath, hoisting the beam in and out of the machine, manipulating starter and valves, etc.), 2 man-hours at.... $0.50=$1.00

Power:

For dye-pump, 8 H.P.
during 1 hour..... = 8 H.P. h.
For vacuum-pumps 5 H.P.
during ¼ hour..... = 1¼ H.P. h.

For hoisting ..... ¼ H.P. h.

9½ H.P. h. $0.02=$0.19

Steam: Heating 200 gals. of water to 175° F., 500 lbs. of steam at..... $0.0005=$0.25

Water: 800 gals. of water at.....$0.00005=$0.04

$1.48

If a beam contains— *Per Lb.*

200 lbs. of yarn the cost will be $1.48 : 200 = 0.74 cts.

100 lbs. of yarn the cost will be 1.48 : 100 = 1.48 cts.

50 lbs. of yarn the cost will be 1.48 : 50 = 2.96 cts.

25 lbs. of yarn the cost will be 1.48 : 25 = 5.92 cts.

With the aid of these figures a corresponding curve has been plotted out in the diagram of Figure 1.

b. Vat Colors. We will find a higher expenditure for this class of colors, say $1.80 per beam. Thus:

If a beam contains— *Per Lb.*

200 lbs. of yarn the cost will be $1.80 : 200 = 0.9 cents

100 lbs. of yarn the cost will be 1.80 : 100 = 1.8 cents

50 lbs. of yarn the cost will be 1.80 : 50 = 3.6 cents

25 lbs. of yarn the cost will be 1.80 : 25 = 7.2 cents

c. Naphtol Colors will figure out still higher, say at $2.00 per beam and the cost per lb. will be 1, 2, 4 and 8 cents, respectively.

When these figures have been marked down in the diagram, we get curves that enable us to find the dyeing process cost for any weight of yarn per beam.

Winding and Warping Costs. As the overhead expenses are left out of the comparison, these costs consist mainly of wages and power.

In the winding department the wages paid are mostly piece rates, which vary for the different counts of yarn. These piece rates form a suitable bases for costing. It suffices to add to them certain percentages for cleaning, transport, etc., and for power to get reliable cost figures.

In the warping department the matter is slightly more complicated. For while the bulk of the warper's earnings are formed by a piece-rate which differs for various counts, additional allowances are often given for employing and refilling the creel, changing beams, etc. There is no telling how often these allowances will be applied and there is no reason to think that they will occur in any relation to the count of yarn which is used, for all depends on the length of the warp, the size of the package, the frequency with which the warper has to change from one count to another, etc. Whereas cleaning, transport, etc., and power may again be expressed in a percentage on the piece-rates, it is better to express the expenditures for creeling, changing beams, etc., in an average figure per pound of yarn.

It also is customary in some mills to apply slightly differing piece-rates according to the number of ends that are warped simultaneously. Here we have a variation, that may be important to the warper, but which is hardly perceptible in the ultimate cost. Hence we are justified to base our calculation on an average number of ends.

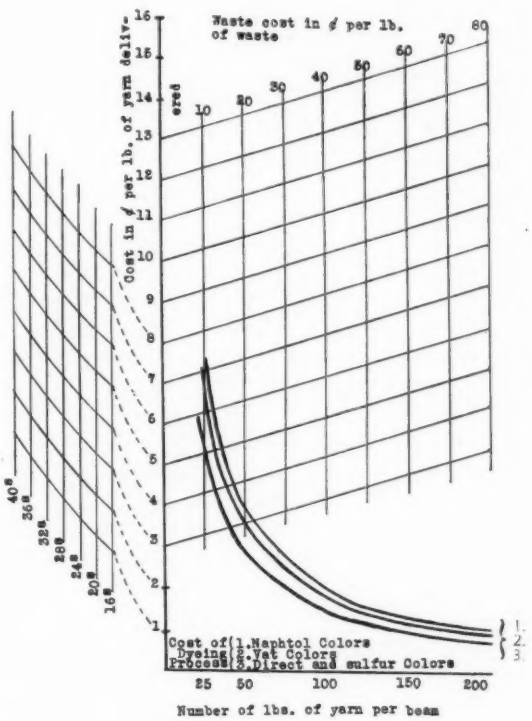
Waste cost in ¢ per lb. of waste
Cost in ¢ per lb. of yarn deliv. ered
Cost of Dyeing Process (1.Naphtol Colors 2.Vat Colors 3.Direct and sulfur Colors
Number of lbs. of yarn per beam

Fig. 1—Beam Dyeing for Warp.

We have now simplified matters so far, that it is possible to compile a total cost figure for winding and warping.

Counts of Yarn	16s	20s	24s	28s	32s	36s	40s
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
Winding wage	1.2	1.4	1.7	2	2.3	2.7	3.1
Cleaning, transport, etc, 4%	0.05	0.06	0.07	0.08	0.1	0.11	0.12
Power, 9%	0.11	0.13	0.16	0.18	0.22	0.24	0.28
Warping wage ...	0.4	0.5	0.6	0.7	0.8	0.9	1.
Cleaning, transport, etc., 6%	0.02	0.03	0.04	0.04	0.05	0.05	0.06
Power, 8%	0.03	0.04	0.05	0.06	0.06	0.07	0.08
Allowances for creeling, changing beams, etc.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total costs for winding and warping	1.91	2.26	2.72	3.16	3.63	4.17	4.74

These expenses have to be added to the expenses of the dyeing-process. Thus, if the dyeing expenses are 1 cent per pound, this should be increased on account of winding and warping costs to 2.91 cents in the case of 16s yarn, to 3.26 cents in the case of 20s yarn and so forth.

There are various ways to make a diagram serve for the execution of such additions, but it is with regard to the possibilities of reproduction in a periodical that we have chosen the method illustrated in Fig. 1. On the left part of the diagram curves have been drawn showing the total costs of dyeing + winding + warping for various amounts of dyeing expenses and for various counts of

yarn. For instance, if the dyeing expenses amount to 1 cent, we follow the dotted line from the point onward, and we find now that the total expenses are 2.91 cents for 16s, 3.26 cents for 20s, 2.72 cents for 24s, etc. Fractions of cents have to be estimated.

Waste. When the dyeing is done in beam form, there are only two sources of waste that count, namely, winding and warping waste.

The amount of waste that originates in the winding, depends to a limited extent on the count of yarn and to a very large extent on the winder's skill and on the state in which the cops are delivered to her. It is obvious that these circumstances cannot be foreseen when the routing of the yarn is fixed, and as a consequence the best plan is, to ascertain what the average waste percentage is.

In the warping department much less waste is produced than in the winding, and we are quite justified in using an average waste-percentage in the warping as well.

In most mills the amount of waste produced is ascertained by ordering the operatives to bring in their waste and by weighing the waste brought in. For the purpose of calculation this method is far from satisfactory. The writer has often kept records of the yarn given out and the yarn brought back and he has invariably found that the difference was not accounted for by the waste brought in. It appears that apart from the visible waste, there is also invisible waste taking place. This phenomenon must be due to part of the moisture evaporating during winding and to other losses, which it would be interesting to trace.

For our purpose it is the best plan to keep a constant record of the invoiced weight (this being the weight that is paid for) of the yarn that is destined to grey warping and of the weight of the grey beams delivered. The difference is waste, both visible and invisible.

In order to obtain a perfectly equitable comparison the amount of waste should be expressed in a percentage of the yarn *delivered.*

The cost of this waste is equal to the yarn price *minus* the price for grey waste. It will be different for different counts and may vary from day to day in consequence of market fluctuations.

Let us assume that during a year 300,000 pounds of cops have been used for grey warping, giving a total waste of 300,000 — 291,000 = 9,000 pounds. Consequently every pound of yarn delivered will give a total waste of $\frac{9{,}000}{291{,}000} = 0.0309$ pound.

If a 16s yarn costs \$0.14½ and grey waste fetches a price of \$0.04½, the waste cost per pound of waste will be 10 cents, which means a waste cost per pound of yarn delivered of 0.309 cent per lb.

For a 20s yarn the waste cost will be 15 — 4½ = 10½ cents per pound of waste or 0.0309 × 10½ = 0.325 cent per pound of yarn delivered.

Thus, the cost of dyeing + winding + warping must be increased by 0.309 cent, 0.325 cent, etc., to find the total cost.

We will arrange our diagram in such a manner, that if we know the waste cost per pound of waste for a given count, we can see at once how this affects the ultimate cost. For this purpose inclined lines have been drawn on the right of the diagram, which show by how much the cost price must be increased for a given cost of waste.

Thus, if we have found that the cost of dyeing + winding + warping is 3 cents per pound, and the waste cost for the count of yarn used is 10 cents per pound of waste, we follow up the inclined line from 3 cents onward, till it intersects with the vertical line that indicates 10 cents waste cost. The point of intersection will lie at 3.309 cents and indicates the total cost per pound of yarn delivered.

Package Dyeing for Warp. This process presents many novel features and for this reason we will explain the elaboration of the diagram for this method of production.

Remnants. Let us first consider a peculiar cost factor, which comes in here, namely, the remnants of yarn which are left on the packages when warping is finished. Sometimes the remaining packages contain still sufficient yarn to serve for a subsequent warping. In this case the packages are kept in store till the same color has to be used again. Thus most colored goods mills have a store of remnants, which entails costs owing to loss of interest, etc.

In other cases the remaining packages are so small, that it would not be worth while to fill a creel with them next time they have to be used again. In this case the small packages are rewound into larger packages, and corresponding costs ensue.

All this means that a colored goods mill which dyes in packages has to put up with a considerable amount of rewinding, the cost of which may by no means be neglected.

In most mills the rewinding is not done in piece-rate, so there is no knowing the cost for each count of yarn separately. It is moreover very doubtful whether the cost has any definite relation to the count of yarn, for the amount of rewinding depends very much on the sort of patterns and on the quantities manufactured. But what certainly should be done, is to keep a record of the wages paid for rewinding. These have to be increased by percentages for transport, cleaning, power, etc., and by the cost interest, for instance, as follows:

Wages for rewinding during 1931.....	\$400
Cleaning, transport, etc., 4%.....	16
Power, 15%.....	60
Interest on remnants stored.....	24
Total cost of remnants.....	\$500

If this figure is divided by the total number of pounds processed, say 100,000 pounds, we find that the cost of remnants works out at 500 : 100,000 = \$0.005 per pound of yarn delivered.

(Continued on page 74)

Glaze vs. Finish

By G. L. ATKINSON

IN all textile fabrics no matter of what type or composition, the matter of finish is an important subject, and in many cases is a vital factor. This factor of finish is important in many ways; not only are customers persuaded to buy the cloth on account of its superior finish, but often manufacturers obtain orders from certain wholesalers solely from the fact that their piece goods although only equal to other cloths in other respects are superior in the matter of finish, similarly a dyeing and finishing concern obtains further or repeated orders solely on account of its superior finish although their cloths may be no more than equal to competing firms in all other respects.

This matter of the finish of a cloth brings in a further advantage in the way of branded fabrics. Generally speaking there are only two things stamped or branded and guaranteed upon any textile fabric, that is, the dyeware used and the finish achieved. Nothing is more advantageous to a firm or to the trade in general than the use of names for different dyes and finishes. The public becomes used to them and places implicit reliance in such trade names.

The finish of a cloth is a very hard term to define, and it is to be regretted that finish is in many cases today a lost art. Glaze upon a cloth is in no sense finish, yet there are many firms and finishers too, who regard the amount of glaze upon a cloth as finish.

The term finish brings in too another term, that of handle, this again is indispensable and cannot be separated altogether from the term finish. The writer has noted many instances of piece goods that were considered to be well finished, but in reality this so called finish was nothing more than surface glaze.

It should be noted, that quite definitely the finish of a piece cannot be decided by passing the piece in question through one machine, or through one process, as some manufacturers claim. There are many things that determine the finish of a piece. It must be stated that the biggest mistake at the present time, is that of confusing glaze with finish as many firms and men are apt to do.

The writer has noted one case of piece goods passing through the final finishing processes of a dyeing and finishing concern, that well illustrates this case of glaze versus finish. The goods in question were botany suitings of very good quality, these being striped designs, and containing stripes of fine mercerized cotton. These goods after dyeing, drying and perching, were passed through the finishing processes usual to such goods, these including stationary pressing in the hydraulic press. The goods were finished and delivered in the usual way, but were returned for refinish in about four days, the complaint being that the goods were too harsh in the final handle. The goods were inspected and it was agreed that although everything possible had been done in finishing, that they were harsh in feel. It was then decided to pass the goods through the rotary pressing machine in an effort to obviate the somewhat harsh finish. This was done and according to the finisher in charge there was then rather too much finish upon the cloth.

It was however decided to submit the goods as they were to the customer. This was done, and a reply was received to the effect that the piece goods were now quite all right with regard to the matter of finish, although there was just a shade too much finish on the cloth.

That the goods were more highly finished at the second time of pressing was an entirely erroneous impression, although the finishing firm in question really believed that they had imparted much more finish to the cloth. To support this, they pointed out that the pieces had been returned by the customer owing to harshness in finish. After passing through the rotary pressing machine, which imparted a much higher finish upon the cloth, the goods were found to be all right and the customer was quite satisfied.

This attitude was persisted in, until one day about a month later the goods were received back from the customer, stating that although the goods had been held in their warehouse, they found that they were again harsh in finish, would the finishing firm be good enough to cure the fault definitely?

This case was essentially one of glaze versus finish and to find the fault it will be necessary to go back a little way. In the first place the fine stripes in these goods consisted of highly mercerized cotton of good quality, and it was these stripes that were to blame for the goods being returned. When the goods were dyed, it was found that the dyeing operation had an impairing effect upon the cotton stripings in the piece. The effect was to leave the cotton stripes very raw, in fact to undo the whole effect of mercerizing.

The trouble with the goods then, when they reached the finishing room, was that the wool portion of the piece was quite satisfactory with regard to soft finish, but as there was a good deal of cotton striping in each piece, this being then raw, gave the impression that the goods were harsh in finish when being handled.

The whole effect of passing through the rotary press, was not to benefit the wool portion of the pieces in any way whatever, but to give a glaze to the cotton stripes in the piece, a similar effect to when they were mercerized before the goods were dyed. This then had the effect of allowing the fingers of the handler of the cloth to slip easily over the cotton stripings, giving the impression of a softened finish. This was the reason that made the customer pass the pieces after the refinishing.

If such a process was a true finish, it would have lasted indefinitely, but on standing in the customer's warehouse which was probably heated, it passed away in little time, leaving the stripings as they were before, the pieces then feeling harsh in finish.

The same effect could have been obtained if the goods in question had been calendered.

What was upon the cloth, after pressing in the rotary machine, was not finish, but purely surface glaze, which would sooner or later lift, as it is in no sense permanent. The same trouble is often found during the finishing of cross bred goods, here the pieces are often decatized or steamed during finishing, then they are cooled by means of the pump on the machine. This produces a glaze upon the cloth, which in many cases passes for finish. This glaze enables the fingers to slip easily and the impression of a full handle and soft finish is gained by the customer. In many cases of cross bred goods, not only are the pieces cooled upon the decatizing machine, but are also subjected to great pressure in the hydraulic press, this giving additional glaze and being called a high finish.

There are two ways in which one can detect this so called finish, firstly, by the fact that the goods are very stiff and cakey in handle, due to cooling on the decatizing machine, secondly, by allowing the goods to stand, when it will be found that the glaze will lift and the goods will generally have a very poor handle.

Finish cannot simply be plastered on a piece indiscriminately, there are in addition so many factors which determine the finish of a piece. Surface glaze can be imposed upon any cloth, by any one process or any one machine, but it is not in any sense lasting, while finish in the true sense of the word is something which is inherent in the cloth, a fact which many finishers today fail to realize, in addition it is dependent upon many things, the most important being as follows, the piece itself, the methods by which it is processed, the work that is put into it, the time it is allowed in all processes, the care with which the operations are conducted, and finally the individual skill of the finisher.

One naturally cannot expect a cross bred piece to have the finish and soft handling qualities of a botany piece. Yet to try and achieve a softened finish, by means of glaze, in finishing upon a cross bred piece is entirely the wrong method, this is not finish. For a softening in the finish of such goods, other methods must be adopted, for example, all cross bred pieces are generally crabbed, to obtain a truly softened finish, the pieces here must be thoroughly steamed after they have passed through the bowls of the crabbing machine, this steaming has the effect of softening the fibers of the cloth to a very appreciable degree, it does more than any prolonged scouring can possibly do, and is actually something inherent in the piece, for the character of the piece has actually changed.

Not only has the piece been softened, but it will be found that the dyeing liquor during the dyeing operation, has a much greater penetration than it would have if the goods had not been steamed after crabbing, this resulting not only in quicker dyeing, but in much better results.

It will be found that when the pieces are being finished, that there is no need of trying to glaze them even to a very small degree, all that is necessary is that they shall have as much steam as is possible to give them. The goods when finished will be found to be quite soft in handle, in addition this is a natural finish, is quite permanent, and there is no suggestion of glaze. Finally this softness is lasting no matter how long the pieces are kept by the manufacturer, wholesaler, or maker up.

To take the case of botany goods, here it is essential that the goods must be properly scoured, and that the pieces have their full time during this operation is vital. After cutting and perching are carried out, the goods are generally damped, here many finishers are under the impression, that this operation of spraying the goods with water, is simply to increase the weight per unit of a fabric, nothing could be further from the truth. The writer has noted many cases, where water was sprayed upon the cloth, irrespective of how much the cloth would take; obviously this differs with different cloths.

Many finishers who spray the goods indiscriminately with water, hurry the pieces on to the next operation, that of decatizing, the goods are then steamed and then cooled, by means of the pump on the machine, to fasten the water in the goods. The combination of pump and water leads to the pieces being glazed, yet this with a little pressing often passes for a true coating finish. Actually it is entirely artificial and there is no finish upon the goods, all being glaze.

To carry out a true finish, these goods are damped simply to aid the finisher in his work, not to make up lost weight in the fabric. Actually the goods should be lightly sprayed, and then should be laid in piles, under damp wrappers, at least overnight. The pieces then heat up in an hour, if they do not they have not been correctly prepared. They are found to be quite cold the following morning, but the important point of this simple operation, is that the fibers of the cloth are allowed their

maximum amount of regain, thus making the piece fuller and softer in every way. This they cannot do, if they are smothered with water, or hurried away immediately to the next process, that of decatizing. No cooling or glazing is ever necessary, in any finishing process, when finish is the object of the operations. If the goods are given proper times, materials, plenty of steam, heat, moisture, etc., the goods will respond themselves to the treatment, and the finish will be there at the completion of the operations.

Finish cannot be imposed upon a fabric, that is the vital point that many people miss, it is inherent in the cloth, but it can be coaxed and improved by suitable methods and skill. That is the fundamental difference between surface glaze and finish.

Annual Sales Meeting

Attended by 50 key men of its organization, including executives, salesmen and chemists, the Annual Sales Meeting of the Onyx Oil & Chemical Co., Jersey City, N. J., was held at its plant in that city during the last week of 1933. Representatives from its Southern, Midwest and New England territories joined the meeting.

At the daily meetings, various papers prepared by chemists on the Onyx staff were read. Victor H. Berman, president, discussed "Boiling-Off, Dyeing and Finishing of Acetate Rayons." Dr. Moshier, head of the research department, covered the subject, "The Seresin Fractions of Silk." Charles E. Maher, Chicago representative, told of "Recent Developments in Hosiery Finishing." E. W. Klumph, Southern representative, gave a talk on "Wetting Out Agents in Mercerizing."

The week's discussions were climaxed by a banquet at the Jersey City Elks Club on the night of December 29th. Mr. Berman addressed his associates, stressing as his theme the fine *esprit de corps* and loyalty shown by every member of the Onyx organization, which made possible the steady growth and increase of friends throughout the textile industry.

Final adjournment was made to the home of Mr. Berman, where the group was given the "run of the house," ending a profitable week in true holiday style.

Romance in a Laboratory

A laboratory courtship terminated in the marriage on January 12th of Logan Grupelli, Manager of Technical Sales for the National Oil Products Company, and Miss Dorothy Potter, who was formerly in the research laboratory connected with the Technical Sales Division. Mr. Grupelli was given a bachelor dinner by his fellow employes before the marriage which took place in Englewood, N. J. Mrs. Grupelli was a graduate of Barnard College and Mr. Grupelli of Lafayette College. They have the best wishes of a host of friends.

Omega Chrome Fast Green G

A new homogeneous chrome green of excellent general fastness properties said to fulfill all the requirements for the following uses: service uniforms and broadcloths, woolen overcoatings and suitings, domestic Oriental rugs and hats in raw stock. In connection with service uniforms this color is said to withstand the severe soap and soda tests for government requirements. Its light fastness is said to be excellent and the fastness to potting and carbonizing very good. It is further claimed that this color maintains its true green shade in artificial light. Shade cards giving details for application and showing samples may be obtained from the Sandoz Chemical Works.

Textile Institute and Style Show

Textile students of North Carolina State College, at a recent meeting of the Tompkins Textile Society, elected officers and mapped preliminary plans for their annual Textile Exposition and Style Show which will be held about the middle of April. Present prospects are that the 1934 Textile Exposition and Style Show will be larger and more elaborate than any of those conducted by the Textile students in previous years.

Election as officers of this annual event is considered among the highest honors that can be attained by Textile students. The officers elected were as follows: Superintendent, G. T. Gardner, Grifton, N. C.; Assistant Superintendent, W. A. Blackwood, Cooleemee, N. C.; Foreman of Yarn Manufacture, T. L. Ritchie, Gastonia, N. C.; Assistant Foreman of Yarn Manufacture, H. D. Whitener, Gastonia, N. C.; Foreman of Weaving, H. M. Foy, Jr., Mount Airy, N. C.; Assistant Foreman of Weaving, K. W. Horne, Mount Gilead, N. C.; Foreman of Designing, P. W. McCollum, Wentworth, N. C.; Assistant Foreman of Designing, R. L. Poovey, Statesville, N. C.; Foreman of Dyeing, T. S. Blackwood, Cooleemee, N. C.; Assistant Foreman of Dyeing, J. J. Griffith, Jr., Kernersville, N. C.; Foreman of Knitting, D. A. Brannon, Rockingham, N. C., and Assistant Foreman of Knitting, E. L. Bolick, Hickory, N. C.

Malium

A new chemical substance, known as "Malium," which will kill insects and their eggs, but which in ordinary concentrations is entirely harmless to human beings, has been perfected by the Michigan Alkali Co. of New York City.

Quarterly Price List

The quarterly price list of the R. & H. Chemicals Dept. of E. I. duPont deNemours & Co. for January has been distributed.

Announcement

The Board of Directors of the American Cynamid Company on January 9th declared, out of its net earnings for 1933, a special dividend of 25 cents per share, payable on February 1, 1934, to holders of its Class "A" and Class "B" shares of record at the close of business on January 19, 1934. The Board of Directors announced that this distribution is to be regarded only as a return to the stockholders out of the earnings for 1933, and not the establishment of a dividend basis or policy for the future, formulation of which should not, in the opinion of the Board, be attempted at this time.

While audited figures for the year 1933 will not be forthcoming for about two months, it is understood that the consolidated net earnings of the company for 1933, computed in the usual way, before including certain items of non-recurring income, are estimated to be something over $2,000,000.

Evening Textile Courses—Columbia University

Spring, 1934.

Registration starts Thursday, February 1st, 1934.

Classes start Thursday, February 8th, 1934.

All courses extend over 15 weeks, one night a week.

The following Textile Courses are offered:

Course: e Z 2—*Cotton Goods Converting.*

7:30-9:20 P. M., Friday evenings, Room 410-B, Mines Building, by Mr. H. R. Mauersberger

Course: e Z 6 R—*Design for Textiles.*

7:30-9:20 P. M., Friday evenings, Room 614, Engineering Building, by Mr. Wm. Arlt.

Course: e Z 4—*Advanced Rayon Course.*

7:30-9:20 P. M., Thursday evenings, Room 410-B, Mines Building, by Mr. H. R. Mauersberger.

Fees for all courses $20.00, plus $7.00 registration.

For further information call or write to H. R. Mauersberger, 303 Fifth Avenue, New York, N. Y., or MUrray Hill 4-1108.

Stainless Steel Wire Rope for Bleaching Kier Assemblies

An improved method for holding down the load in bleaching kiers with an assembly of stainless steel wire rope is said to be adopted in many divisions of the textile industry. Its advantages are the light weight of wire rope, yet a high strength as compared with chain, and resistance to the effects of peroxide solutions, steam, etc.

The Hazard Wire Rope Company of Wilkes-Barre, Pa., are building these assemblies of 18% chromium—8% nickel stainless solid alloy, the complete assembly weighing less than 25 pounds. It consists of a center ring 12 inches in diameter to which are attached six ropes with hooks at the other ends for hooking into the holes in the angle irons or other attachments on the inside wall of the kier. Ring, hooks, rope and attachments are all made of stainless steel. The ropes are fastened permanently to the ring by eye attachments as well as to the hooks by patented fittings. The eye attachments are free to move on the ring. These assemblies are supplied for any diameter kier.

New General Releases

The General Dyestuff Corporation announces the release of circulars on the following products:

Emulphor A-Oil Soluble—a new emulsifier said to be of advantage when emulsions free from soap are to be produced. It is recommended by the manufacturers for emulsifying liquid fatty oils but is not suited for fatty acids nor for mixtures of neutral oils and fatty acids.

Plurafil Pure Green GA—a new addition to the line of Purafil colors, which when dyed from a neutral Glauber's salt bath is said to produce on mixed goods containing also acetate silk, bright uniform green shades.

Fast Orange Salt LG—The circular illustrates and gives formulae for prints of this salt on goods prepared with Naphtol AS-OL and AS-LT and also discharges and resists.

Soromine SG—a new type finishing agent which is a neutral white paste that can be used in hard as well as soft water. It is said to produce on rayon knit goods a scroop similar to that of pure silk, having the same smoothness and the advantage of being free from fatty acids.

Re-elected President

The re-election of Howard Coonley to the presidency of the American Standards Association for the year 1934 was announced at the annual meeting of the Association. Mr. Coonley is the president of the Walworth Company, New York, and also a director of several industrial, insurance, and banking organizations. F. E. Moskovics, chairman of the Board of the Marmon-Herrington Company of Indianapolis, and vice-president of the American Standards Association, was also re-elected for the coming year.

J. C. Irwin, representing the American Railway Association, and F. M. Farmer, representing the American Society for Testing Materials, were elected to the chairmanship and vice-chairmanship, respectively, of the Standards Council of the American Standards Association, the body in charge of the development of technical standards.

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

JANUARY 29, 1934

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The Growth of Art in its Application to Textiles*

By W. H. THOMSON

SCIENTISTS tell us that the progress of the human race from its earliest beginning down to the time when it emerged from the twilight of the unrecorded was a long upward struggle toward the light. The best evidence of that progress to me are the tables and utensils we use when we partake of our food, for when man first sat at a table and partook of his food from a crude clay bowl that he had fashioned creatively by his own hands, he had made a tremendous stride toward the goal for civilization, and had left forever behind him the groveling of the beast.

This first crude clay bowl might be the thing that started barter. It was something new and useful, and, therefore, desirable because it was useful. As the barter value became evident, it was natural that the product might be improved artistically so as to increase its barter value. Through all this would be developed the desire to make a beautiful, artistic thing for the sheer pleasure of achievement.

The hardening of clay vessels was no doubt an accidental discovery, as so many discoveries have been. Someone observant beyond his fellows probably discovered that when he placed his clay bowl over the fire to heat his food, where the hottest part of the flame touched it, it became hard, and then it would be only a step to conceive of some sort of crude kiln in which the clay vessels might be baked to harden the clay.

It was by such steps as these that the human race

* Presented at meeting, R. I. Section, October 27, 1933.

progressed along the road to better things. The ancient Greeks had a motto, "Pursue the Beautiful." To such purpose did they follow their ideal, they came to possess the genius for Beauty, just as the Romans possessed the genius for Law, and the Jews the genius for Religion, and the "Golden Age of Pericles" has handed down to us in sculpture a standard of Beauty that has been at once the admiration and despair of all those who since that time have tried to follow after.

Perception of beauty and its appreciation are to some people a gift, but to most people it must be taught. I am one of those who believe that the appreciation of art should be taught in the public schools. I believe in it in spite of the fact that a great many people today advocate cutting the frills out of public schools, and consider the appreciation of art one of them. When all around us people are going through life just looking and not seeing!

Some of you know Fall River, most of you have passed through it at sometime or other on your way from Providence to the Cape. Right at the top of the hill is President Avenue,—an excellent vantage point. The valley lies below, you can see Providence and the Hospital Trust Building, the gray line of the Connecticut hills, and the Blue Hills at Dorchester. Just imagine yourself there when the afternoon is rolling itself into one of those glorious sunsets that we in Fall River are so often favored with. You are trying to think of something sublime and beautiful, when along comes a "girl in a little green hat" She stops for a moment, glances at the glory of the dying day, turns to her escort and says, "Ain't it nice?" then passes on. Now, if these young people had been educated in the appreciation of art, they would have found a great deal of value not only in sunsets, but in other things as well. For the beauty of the commonplace lies all about us, but we must have eyes to see and ears that hear.

John Ruskin, said to be the most eloquent and original of all writers upon Art, who received his degree from Oxford in 1842, wrote two books, "The Seven Lamps of Architecture" and "The Stones of Venice," both being efforts to introduce a new and loftier conception of the significance of domestic architecture. John Ruskin could talk very convincingly of the beauty of a brick wall, and to him it had beauty, for he had vision. Shakespeare implies that if we have vision we may find "Tongues in trees, books in the running brooks, sermons in stones, and good in everything."

Art in Industry

When we turn to the consideration of art in industry, we might as well recognize at the beginning that beauty and utility always go hand in hand, for while usefulness makes a product a commodity, beauty enhances its value and makes it merchandisable.

The particular industry about which I am going to speak tonight is that of Calico or Textile Printing, because that is the industry that I know the most about, having spent the greater part of my life in it. The word calico comes from Calicut, an ancient city in India. Calicut should not be confused with Calcutta on the north eastern coast. The earliest explorers who first contacted India found beautiful printed fabrics in use there. The printing was arrived at by the simple device of taking different sized and different shaped pebbles, dipping them in coloring matter, then transferring to the face of the cotton cloth in some sort of a design. They also had a dyeing process, which consisted of placing different sized and shaped pebbles on the surface of the cloth and tying them tightly into the fabric, then dipping the cloth into the dye kettles, taking out and drying. In this way they obtained a beautiful design, shaded from the full depth of the color down to the very lightest. Where the tightness of the cloth had prevented capillary attraction, the cloth was left white. This process was subject to immediate improvement by substituting for the pebbles definitely shaped wooden blocks.

This industry went from India to Persia, from Persia to Asia Minor and then to the Levant, from there to Europe, Bavaria, Alsace and Switzerland. From Europe it went to England and Scotland, and from there, still following the path beaten out by the Westward course of empire, it came to our own New England states, and is the reason why most of us are here tonight.

As this art passed thorugh the different countries that took it up, it was only natural that it should acquire some distinctive motif of design. For instance, the design from Persia was the pine cone motif, and no matter how much the design may be changed, it is still recognizable, and in the design schools today that particular motif is known as the Persian pattern. The highest example is found in the old Paisley shawls. This design came from Scotland, for Paisley is in Scotland, you know. While in Scotland, let us say just a word for her. I know of late years she has been despised because of her devotion to a virtue, but after the days through which we have just passed, I venture to say "thrift" has been recognized as a virtue. Because of this scorn, Scotland has been neglected in her achievement. In fabrics, she has handed down to us a motif of design that will always be attractive. I refer to the Clan Tartan or Scotch plaid. The motif of Asia Minor is the broad Oriental stripe. If there is anyone here besides myself who would understand a Scriptural allusion, I will suggest that in all probability "Joseph's coat of many colors" was an Oriental stripe, the broad Oriental stripe. The refinement of that stripe was the beautiful brilliant Roman cluster stripe. I will remind you that the Clan Tartan of Scotland is just a stripe crossed on itself. The contribution of the Continent is the floral effect, in which the rose predominates.

I know of no industry that depends on art for its success as much as textile printing does. The number of designs used by an average print works every year is simply amazing. They run up into the hundreds, and if we take into consideration the different combinations of color to which each pattern is susceptible, the selections will run into the thousands.

In these days, when sending a design down to the works, it is customary to send along with it a number of small selected pieces of painting of some particular feature of the pattern, showing the color combinations desired. These selections are not in any way accidental; they are based on scientific selection,—the laws of color harmony. The selection of harmonious and complimentary colors has reached the scope of an exact science.

Ancient Colors

When we speak of color, we immediately step into enchanted land, the land of Aladdin's lamp and the wizard's wand, for the colors produced by the chemist not only rival the colors of the rainbow, but surpass them in variety and beauty. They have given colors to the printing trade that will last as long as the fabric on which they are printed, and will retain their original color and brilliancy.

Probably the oldest color known to the human race is Indigo. Pliny speaks of Indigo in his writings of the first century. Indigo is also mentioned in ancient Sanscrit writings, but the best evidence we have of the age of Indigo is the fact that some of the Egyptian mummies from the tombs at Thebes were wrapped in fabrics dyed with Indigo. These mummies belong to a Dynasty 3000 years before Christ. The conditions of Egypt were not such as would warrant the growth of Indigo, therefore, the Indigo must have come from India, and it may be that the dyed cloth in which the mummies were wrapped came from India, brought from there by Phoenician traders.

The most romantic color that we know is Tyrian purple. Tyrian purple is obtained from a shell fish found on the shores of the Mediterranean Sea. Julius Pollux refers to Tyrian purple in the second century. There is a legend connected with the discovery of Tyrian purple. It would seem that in the days when there were nymphs, gods and demi-gods, a nymph by the name of Tyros was one day walking along the shores of the Mediterranean Sea with her lover, Hercules, and her little dog, when suddenly the dog saw a shell fish, and as has been the custom with dogs from time immemorial, he bit it and chewed into it, and Tyros noticed that his lip was stained a beautiful purple color. She immediately expressed a desire to possess a dress of that color, and Hercules, who never allower anything to beat him, made it come to pass some way or other. That's how purple was born. Tyrian purple was worn by the Roman emperors. It was an extremely expensive color, as only one drop of color could be obtained from one shell fish. Consequently, only the very wealthy could afford to buy it. In the time of Emperor Augustus, one pound of purple dyed wool cost 1000 Denarii, equivalent to about $165.00 of our money. When Alexander the Great conquered Babylon, he found in the royal treasury an accumulation of dyed purple cloth and garments, stored as tangible wealth, giving some evidence of the value in which purple was held.

The ancients did not have very many colors,—purple, Indigo, a few dark reds and browns obtained from the madder plant, and a scarlet obtained from a beetle. As a matter of coincidence, when the Spaniards conquered Mexico, they found there a scarlet obtained from the insects which lived on a certain kind of cactus, which gave its name to the color, Cochineal. This is the brilliant scarlet which up until the World War, at least, was used for the scarlet of the British uniforms.

Indigo is a vegetable dye, and Tyrian purple an animal dye, and both have since been reproduced synthetically.

The chemist thinks in terms of molecules, and it is because of the nature of these molecules, their arrangement and quality that the chemist is able to wave his wizard's wand, which is a small glass rod, and produce a combination which will result in color. The nature of these molecules, in fact their very existence, is based on an accumulation of observed facts, and it is to the credit of the chemist that these facts are so arranged that no one can dispute his conclusions.

Thus, we find a great industry formed and operated because of the desire for beauty in color and in form.

Printing

It was a little over a hundred years ago that the printing machine was invented. Up until that time printing was done with blocks, much the same as the Hindu with his pebbles, dipping the blocks in color and then applying to cotton cloth. Block printing was done on a table on which was spread the cloth to be printed, this cloth being spaced off to the size and spacing of the design. The design was engraved on a block of wood with the design raised. The block was dipped into coloring matter, placed on the line, then hammered with a mallet. This pounding was to insure penetration of the color into the cloth. It was dipped again and hammered again, dipped again and hammered again, and so on. Other wooden blocks were used when several colors were to be represented on the cloth. Block printing depended for its success a great deal upon the skill of the block cutter and block printer. The skill of the block cutter was recognized, and he was very well paid. Block cutters and printers were known as the "silk hat" men of the days when block printing was at its height. Block printing had developed to quite a state of perfection when the printing machine was intro-

duced. Instead of cutting out the wood, as was originally done, they had taken a piece of thin copper wire and outlined the pattern, hammering it down into the block. Then, between the spaces that had to be printed they packed felt. This felt went below the edge of the copper wire just appreciably, so that when dipped in color, the felt carried the color, and the copper wire controlled the spaces and kept the color from flooding over. You can imagine how these people laughed at the idea of a machine taking their place. The new process was absolutely revolutionary. Where block printing called for flat printing, we find the new process calling for rotary printing and the use of an engraved copper roller. Instead of printing one piece at a time, the new process was rotary and continuous. The two processes ran side by side for a while, until the printing machine outstripped the block printing process and it faded out of the picture.

Distribution

I think I should say a word about distribution, because this is what industry exists for. I have seen a chart with thin red lines of direction showing the distribution and destination of the product of one of the largest print works in the world. These lines of distribution went all over the globe. Wherever those lines went, they represented service, represented the distribution of a commodity that was going to benefit mankind. I have seen cases lined with zinc into which cloth was to be packed. This was to make them impervious to the action of water, because they were going to South America. South America has a very long coast line and very few good seaports, so that of necessity frequently the steamers anchor off-shore, and the cargo is transferred to small boats or lighters, which, due to the heavy surf, are frequently awash. Hence, the necessity of waterproofing. I have seen cloth packed into small bundles that must weigh no more nor less than just a specified weight, because they were going to constitute the loads to be placed on the backs of the llama. I refer to the South American llama, which is not to be confused with the lama of Tiber who is a different sort of animal. This South American llama was the only beast of burden that was known in America until the Spaniards brought over the horse and the donkey. It is a small second cousin to the camel. If it is overloaded, it will lie down, and neither persuasion nor abuse will move it, until the load is taken from its back and repacked to the correct weight, and the chances are that on the second loading he will not carry as much as he would have had you been honest with him in the first place. This is the reason for the exact weight of these small bundles.

I have taken you far afield, and it is time to come back home, but let us remember that if there is a woman in the Philippines, if there is a native of the South Sea Islands, if there is an inhabitant of some village in the Andes who has been made happy because of the possession of a beautiful garment, she has been made happy not only because of men like you who are engaged in the promotion of the modern industry, but also because traveling back along the devious streams of influence, across the storms of oceans and the obstacles of continents, back through the years that have rolled themselves into the centuries, there was an unknown Hindoo who conceived the idea of dipping a pebble in coloring matter and making its imprint on a piece of cotton cloth.

So are we bound together by circumstance, that great law by which we are reaping where others sowed, and are sowing where others will reap. Let us, therefore, render good services for "We will not pass this way again."

Discussion

Mr. Lawton: Where was the printing machine developed?

Mr. Thomson: A patent was taken out in France and one in England at almost the same time. There was just a little difference in point of time. I think the English had the advantage. May I say just a word extra?

The English deserve credit for a good deal of the color industry. The dyestuffs industry has been achieved in spite of the obstacles that beset its path. For instance, Baeyer in Germany took 18 years to develop the formula for Indigo, and it cost a million dollars to finance it. Then W. H. Perkin, the English inventor, perfected mauveine. He was trying to discover a method of making quinine when he stumbled across mauveine. This aniline color was the basis of all aniline colors later developed by the Germans. Mauveine was derived from aniline, also the discovery of an Englishman from coal tar. While a great deal of credit is due Germany for her methodical persistence, the credit for the original discovery goes to England.

I think it might be said that so far as the printing machine is concerned, there has been very little improvement made over the original design, except that larger machines have been built for multi-color printing, and the machinery has been speeded up for the purpose of increased production. Fundamentally, the principle is the same.

Mr. Lawton: Were copper rollers used in the beginning?

Mr. Thomson: Yes.

Proceedings of the American Association of Textile Chemists and Colorists

Some Notes on

Penetrants*

By ANDREW J. KELLY
Burkart Schier Chemical Company, Chattanooga, Tenn.

IT IS more than passing strange that penetrants and wetting agents for the textile industry have only recently received widespread attention and study. Penetration in wet-processing is of the utmost importance. Yet it is only within the past few years that the matter has been given really serious thought and research. In a paper written two years ago I ventured to say that the current textile trade journals comprised a complete bibliography for textile penetrants and wetting agents; the statement is even more true today. The subject is still too new for books. Penetration is, however, linked with a topic which is somewhat familiar to all and which is treated in every textbook of physics or chemistry—surface tension or surface action.

This paper was presented before a joint meeting of the South Central Section of the A. A. T. C. C. and the Chemists' Club of Chattanooga on the evening of November 24th, 1933. Since many of the group were unfamiliar with textile wet processing, some of the material is necessarily of a more or less elemental nature.

The use of penetrants in the textile industry is based solely on one requirement: the rapid and thorough wetting of fibers by water or aqueous solutions. That is the fundament of it all. Perhaps some of you do not realize just how much resistance toward wetting is shown by the average yarn. I will drop this small hank of unboiled cotton yarn in water; you note that it floats on the surface although its specific gravity is about one and a half times that of water. Even total immersion, you see, has no effect; wetting does not take place. The yarn is still in about the same condition as the proverbial duck's back. The same is true of other untreated fibers, whether of vegetable or animal origin. If we use hot water the resistance to wetting is practically undiminished. But dyestuffs can penetrate only where their liquid medium carries them; scouring and finishing chemicals act only in the wet state. In fact, to properly conduct any wet finishing operation the material in process must be thoroughly and uniformly impregnated with the aqueous liquor in which it is immersed. Penetrants and wetting agents are developed and produced to do exactly that.

In most dye plants the first operation on any material is scouring, to remove wax, grease, or dirt present either naturally or through mill accumulation. Here is some cotton that has been refluxed for twelve hours in caustic soda (sodium hydroxide) solution. Impurities have been removed and it is practically pure cellulose. It wets immediately in tap water, quite unlike the raw cotton which I now drop in (demonstrating). So it seems that penetration is simply a matter of scouring—that a well scoured yarn will require no penetrant for subsequent bleaching, dyeing, or finishing operations. But it isn't so simple, as that. In the first place, except in a few instances it isn't commercially practical to give a scour such as given the purified cotton here. And in the second place, it is known from practice that even well scoured textiles, loaded into a dyeing machine, require more than hot water to carry dyestuffs and chemicals into closely knit or woven seams or sections. Furthermore, scouring is greatly expedited with the aid of a good penetrant; for instance, caustic soda solution is a very poor wetting agent. And so it is we find penetrants are used in almost all of the wet-finishing operations; many of the penetrants are in fact efficient scouring, dye-levelling, and softening agents as well as surface tension depressants.

Wetting has been described as the spreading of water upon surfaces. Textile materials as delivered to the mill chemist for wet processing contain a considerable volume of entrapped air, upon the surfaces and between the individual fibers. Before such material can be effectively wet-out, water must displace the air; a water-solid interface must be substituted for the air-solid interface. A dissolved or colloidally dispersed substance which lowers the surface tension of a liquid toward air will, in gen-

*Presented at meeting, South Central Section, Nov. 24, 1933.

eral, lower its interfacial tension toward a solid. The exact manner in which this action occurs is not well established, but we shall later consider a few of the modern theories of wetting action. We know that textile penetrants do enable the aqueous processing liquor to quickly spread over the surface of the textile material, displacing air; and rapidly filling the interfiber spaces. Most of them, in addition, have some solvent effect on wax or grease present, which expedites the penetration. If we add a few drops of some penetrant, such as this soluble pine oil, to cold water, and then drop in another small hank of the unboiled cotton, the wetting is immediately noticeable and the yarn, being heavier than water, will quickly sink (demonstrating). Any remaining unwet fibers are now quickly saturated by the wetting liquor.

Before the introduction of scouring and wetting agents, the earliest textiles were no doubt cleansed at the riverside by rubbing with sand or other abrasive. A solid-water interface was obtained by forcing the two together to exclude air. But with the advent of soap came a true surface tension depressant, a modern wetting agent. Soap is today still one of the most important wet processing materials, being used to some extent in nearly all operations. It has, nevertheless, some inherent defects, such as forming insoluble soaps with hard water, and being rather slowly soluble at low temperatures.

Sulfonated Compounds

A new agent, possessing new and unique properties, was Turkey Red Oil, or Sulfonated Castor Oil. It was invented, or discovered, about 1875 and first used on a large scale in 1877. It is obtained by properly treating castor oil with sulfuric acid, with subsequent washing and neutralizing operations. The product is a clear, viscous liquid, easily soluble in cold water, and showing considerable resistance to moderate hardness (demonstrating). The fatty-acid of sulfonated castor oil being also soluble, permits the use of the oil in mild acid baths without disintegration. The sulfonated oils enjoy a wide use in the industry, because of the virtues mentioned and because they aid in level dyeing and impart a good luster and feel to textiles. They do not possess the same detergent properties of soaps, but they do definitely serve as surface-active agents.

The search for more effective penetrants continued. Other sulfonated or sulfated compounds were offered and are still being offered. Alkyl derivatives of naphthalene sulfonic acid were among the first. Here is a product of that type, familiar to many of you under its trade name. When used with ordinary soaps these products tend to prevent the formation of sticky insoluble soaps, and they possess other desirable properties. Abietic acid derivatives, generally in the form of the sodium salt of abietene sulfonic acid, have met with some success. Abietic acid is the chief constituent of ordinary rosin. Most recently, the sulfated fatty alcohols have been developed and marketed. They are the neutralized half sulfuric acid esters of fatty alcohols. Here is a commercial product of the type. These products show, it is said, detergent properties similar to the sodium salts of the corresponding fatty acids, but are superior under hard water conditions; the calcium and magnesium salts of the fatty alcohol sulfates are soluble and possess detergent value. They give a neutral solution in water, with no formation of alkali. They can be used in an acid medium. They are, in fact, stable to almost any condition of use.

Soluble Solvent Compounds

Viewed from the standpoint of penetration alone the soluble solvent compounds are worthy of particular consideration. In brief, such a penetrant might consist of some solvent or solvents compounded with an emulsifying agent; the mix so prepared as to be easily soluble in or miscible with water and to form a stable union. The emulsifying agent may be soap, sulfonated oil, or one of the other sulfates referred to above; all are in use. The solvents incorporated are even more varied: pine oil, cresol, tetralin, hexalin, ethylene dichloride, carbon tetrachloride, dichlorethyl ether, amyl acetate, xylol, trichlorethylene. All may be encountered, either alone or in combinations. Because of its ability to carry large percentages of solvent in stable solution or emulsion in water, even when greatly diluted, sulfonated castor oil is much favored as a base for these compounds. Mixes of sulfonated oil with pine oil, cresol, or similar solvent are used. Such compounds may be considered as typical of the soluble-solvent class. Their speedy wetting action has already been shown and applies in incredibly weak dilutions.

Practically any solvent, in suitable combination with soap or soluble oil, will act as a wetting agent or surface-tension depressant, but some, of course, are much superior to others. These compounds are considered to owe at least a part of their efficiency to some dissolving action on the waxy or greasy matter in textile materials. And yet, amazingly small percentages of penetrant have marked wetting properties, as mentioned above. Where one per cent of penetrant on the weight of goods is used, in a twenty to one bath, that is equivalent to a mere five one-hundredths of one per cent aqueous solution. Strangely, water miscible oil or fat solvents, such as acetone, for instance, used alone do not have anything like the efficiency of the compounded penetrants. The colloidal dispersion type of wetting agent is very much superior to

the true solution type. It is said that high temperatures give true solutions of some penetrants and that this fact may explain their lessened wetting action at such elevated temperatures. Only in solutions of 25 per cent or more does acetone show an appreciable wetting effect (demonstrating). In solutions of over fifty per cent the wetting is instantaneous. The same may be observed with ethyl alcohol. Such quantities are, of course, commercially impractical, not to mention the fire and health hazard.

Concerning the relation of concentration of penetrant to penetrant action, a few experiments were made, using a commercial soluble pine oil. The observed lowering of surface-tension, judged by wetting action, was in direct proportion to the concentration of penetrant, up to the point where the increased viscosity of the solution was sufficient to impede wetting. This no doubt applies to most of the sulfonated oil-solvent compounds. It is also in line with data reported on the benzene and naphthalene sulfonates.

Acidity and Alkalinity

The extremes of acidity and alkalinity to which textiles are subjected in ordinary commercial practice are found in the carbonizing of wool and in the mercerizing of cotton. Wool is carbonized by treatment in strong acid solutions, perhaps 5 per cent sulfuric, with subsequent heating and drying, to remove vegetable matter. Cotton is mercerized by immersion in a cold aqueous solution containing approximately 25 per cent of sodium hydroxide. Wetting agents for both processes are available, but those for mercerizing are receiving more attention at present. It might seem that a concentrated solution of alkali would in itself be a good wetting agent, but cotton shows equally great resistance to wetting by it as it shows to tap water (demonstrating). The viscosity of the mercerizing liquor is itself an impediment to speedy wetting. It was noted quite a long time ago that some wetting assistance was needed in mercerizing, but somehow the agents tried required too great a concentration for economy, or presented a health hazard, so they were dropped and wetting obtained in operations prior to immersion in the caustic liquor. The subject has been recently revived, with remarkable results. Agents of a phenolic or cresylic nature, mixed with such organic compounds as cyclohexanol, diethylene glycol monoethyl ether, triethanolamine, and pyridine are so prepared as to be perfectly and clearly miscible with the mercerizing bath, and are truly amazing in their wetting action. As with other penetrants, these mercerizing aids act in very low concentrations; one per cent of the weight of caustic solution is often adequate. Whereas it was formerly absolutely necessary to desize and preboil cotton before mercerizing to obtain yarn of highest quality, these operations are often eliminated when the penetrant is used. With one of these little hanks of unboiled cotton I will show you the action of a typical mercerizing penetrant (demonstrating).

Research

Research on the subject of penetration of textiles has been approached with renewed vigor because of the wide use of wetting agents and the wide interest in them. The research committees of several textile organizations and the textile schools of several universities are doing valuable work. Neville and Jeanson of Lehigh University recently published the theory that wetting agents of the sulfonic acid or acid sulfuric ester type contain an active polar or water-soluble group and a hydrocarbon chain; and that in aqueous solution the ions are oriented perpendicularly to the water with the polar group in the water and the hydrocarbon chain extending into the air. The electric charge of solutions of wetting agents is being considered—it largely determines the degree of absorption of penetrant and hence the economy of use. The study of surface tension in its special relation to textile wet processing is, of course, of major interest and is not being neglected.

Practical tests of wetting agents and penetrants, which may be made quickly by the man in the mill, possess considerable value. The simplest test of all is the drop test which I have been using in the simple experiments conducted here before you. The Clark Draveson method of testing involves total immersion of yarn in the wetting solution and gives better comparative results, though it is also a sink test. Another measures the per cent of shrinkage of a measured skein of yarn when immersed for a definite period of time. These tests are handy both for the mill man and the manufacturer, but in the final analysis the true and great testing laboratory for any textile wet finishing agent is the dye plant. Every product must stand or fall by its own merit.

CALENDAR OF COMING EVENTS

Meeting, Rhode Island Section, combined with meeting of the R. I. Section of the American Steel Treaters Ass'n, February 7th. Robert Williams of M.I.T. will speak on "Corrosion."

* * *

Meeting, Philadelphia Section, March 2nd, Penn Athletic Club, Philadelphia.

JANUARY MEETING, NORTHERN NEW ENGLAND SECTION

A REGULAR meeting of the Northern New England Section was held at Cambridge, Mass., Jan. 5, 1934, at 7:30 P. M.

The regular dinner preceding the meeting served at Riverbank Court, was attended by about 40 members. Mr. Edward Weber of the National Aniline Company then provided a few minutes entertainment with motion pictures taken at the outing last June.

After dinner, the group adjourned to one of the lecture rooms at the Massachusetts Institute of Technology where Professor E. R. Schwarz of the Institute gave a very interesting and instructive lecture on "Advances in Textile Microscopy." Professor Schwarz is probably the leader in this subject in the United States and spoke with authority. His descriptions and illustrations of his technique and the physical and mathematical inferences derived therefrom provided a very impressive lecture for his audience.

The Section is also pleased to welcome Professor Schwarz as an active member of the Association.

CLARENCE L. NUTTING,
Secretary.

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AMERICAN
DYESTUFF
REPORTER

LOUIS A. OLNEY, Sc.D.
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

NORMAN A. JOHNSON
Managing Editor

MYRON DREW REESER
Advertising Manager

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RAY ON STATISTICS

ACCORDING to the *Textile Organon,* publication of the Tubize Chatillon Corp., rayon production in 1933 set a new high record of 207,578,000 pounds, a figure which was 54% above the total of the previous year which amounted to 134,814,000 pounds. It was also 45% greater than the previous record year of 1931. What is more important, the consumption of rayon during 1933 kept pace with the production, the total consumption being only about one-half million pounds under the production. The year end stocks for 1933 showed but a small increase over the December 31, 1932 stocks, yet they amounted to less than three weeks' supply. From these facts and figures we may conclude that the state of the rayon industry as regards the balance between production and consumption is in a very healthy condition.

These figures were obtained through the cooperation of producers representing practically 90% of the industry and in addition to the 1933 statistics, figures are also given for other years back to 1911. The producers reporting for this entire period represented 100% of the viscose process, 100% of the cuprammonium process, 100% of the nitrocellulose process and approximately 30% of the acetate process.

Figures furnished by the producers were compared to figures given out by the Government's Census of Manufacture and it was found that there were not any serious discrepancies although it is mentioned that for the year 1923 the Census production figures were about 2,000,000 pounds above the sum furnished by the rayon producers. Certain other discrepancies occurred which were traceable to a difference in set-up as regards the breakdown by denier. It is also noted that the 1930 figures of production and consumption are particularly out of line with trade estimates. Trade estimates gave a 1930 production total of 110,000,000 to 119,000,000 pounds but actual production in that year reached a total of 127,000,000 pounds.

Figures for domestic production and consumption from 1911 to 1933 are as follows:

Year	Domestic Production	Domestic Consumption
1911	364	2,134
1912	1,111	2,861
1913	1,816	3,996
1914	2,422	5,182
1915	4,334	6,559
1916	5,778	6,643
1917	6,544	7,064
1918	7,386	6,316
1919	8,278	9,300
1920	10,229	9,479
1921	14,991	19,747
1922	23,700	24,661
1923	34,494	32,563
1924	36,328	42,232
1925	51,902	59,125
1926	62,692	60,627
1927	75,555	100,022
1928	97,232	100,133
1929	121,283	131,329
1930	126,806	117,196
1931	150,879	157,359
1932	134,814	152,178
1933	207,578	206,773

The above figures represent thousands of pounds. The figures above do not indicate exports and imports nor stocks on hand at the end of the year, all of which are included on the original report and to which we refer our readers who desire more complete information in regard to this subject. The figures we quote do show, however, the steady and rapid growth of this remarkable man-made fiber from 1911 to 1933. Judging from its past performances this product of the chemist is here to stay and to expand still further.

What is probably of more importance than production figures to the textile chemist is further development of rayon to extend its uses. The development of new desirable properties to enhance the beauty and increase the serviceability of rayon all lie within the scope of the chemist.

Dyeing Cops, Packages or Beams

(Continued from page 60)

This figure is represented in our diagram, Fig. 2, by a horizontal line at 0.5 cent so that all costs are increased by 0.5 cent per pound.

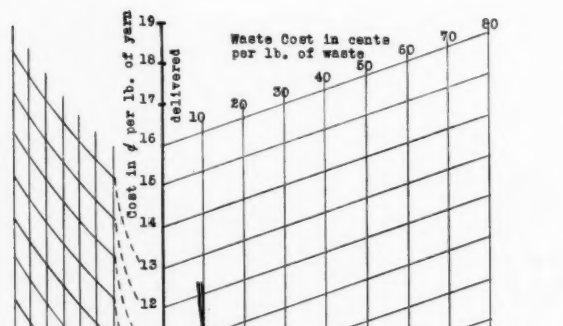

Fig. 2—Package Dyeing for Warp.

It will be understood that this is an average figure. Cases may occur in which the cost of remnants is substantially higher. Suppose, for instance, that 500 packages containing 100 pounds of yarn of a certain color are needed for warp. These 100 pounds of yarn may be dyed in one batch consisting of 168 packages of 0.6 pound each. In doing this we obtain a sufficient weight of yarn but an insufficient number of packages. Hence 167 packages have to be split up into three by rewinding and one package is left to be split up as necessity arises.

It is obvious that in this case the rewinding costs amount to much more than 0.5 cent per pound. In an outstanding case like this, it is best therefore to make a special calculation of the rewinding cost and to substitute this for the average cost figure.

Redyeing of Remnants. It sometimes occurs that remnants of a certain color are not wanted again, and they are then redyed in a darker color or in black. In this case the new color is not materially dearer than it would be otherwise, but the old color is destroyed and this means a loss. The value lost is different according to the price of the original color, but it is not possible to know in advance which color will be partly redyed and which not, so all we can do is to calculate with an average price for Naphtol colors, Vat colors and Direct and Sulfur colors. For a certain mill we may estimate the average price for:

Naphthol colors ..... at 15 cents per lb.
Vat colors ..... at 35 cents per lb.
Direct and Sulfur colors..... at 11 cents per lb.

If the records show us that 3% of the dyed yarn is ultimately redyed, this means a cost of redyeing of 0.45 cent, 1.05 cents and 0.33 cent, respectively, per pound of yarn delivered. These figures are independent of the size of batch in which the original color was dyed. We will bring them into our diagram by simply adding them up to the respective costs of the three classes of colors.

Hydro-extracting and Drying. This operation did not occur with beam dyeing. The costs are independent of the size of the batches, so that we may figure out an average figure per pound of yarn. This figure will have to include expenditure on transport, power as well as on labor. If it amounts to 0.5 cent per pound we can represent it in our diagram by drawing a horizontal line at 0.5 cent above the one representing the cost of remnants.

Loading and Unloading of Carriers. It would seem at first sight that this expenditure is strictly proportional to the number of pounds processed, but it is not. For if a carrier is only partly filled, the empty skewers have to

be stoppered off and this entails an amount of work which is approximately equal to the work of skewering the bobbins on. The same applies to unloading. This item of cost may therefore be best expressed in a figure per batch of yarn, the same as the cost of the dyeing itself. In fact, to simplify matters these two items may be combined.

Dyeing. The cost of dyeing is calculated in the manner shown under "Beam Dyeing for Warp," and has then to be increased by the cost of loading and unloading.

a. For Direct and Sulfur Colors we may find:

Cost of dyeing per batch.....	$1.48
Cost of loading and unloading per batch.	0.66
Total	$2.14

We can now figure out the cost per pound for various sizes of batches and have to add to it the cost of redyeing remnants which we have found above. Thus:

For a batch of—	*Per Lb.*
200 lbs. the cost will be 214 : 200 + 0.33 =	1.4 cents
100 lbs. the cost will be 214 : 100 + 0.33 =	2.47 cents
50 lbs. the cost will be 214 : 50 + 0.33 =	4.61 cents
25 lbs. the cost will be 214 : 25 + 0.33 =	8.89 cents

b. For *Vat Colors* the cost of dyeing will be higher and the cost of redyeing remnants, as we have seen, is considerably higher. We will find a cost per pound of 2.28, 3.51, 5.97 and 10.89 cents, respectively.

c. Naphtol Colors. A similar calculation will give for this class of colors a cost per pound of 1.78, 3.11, 5.77 and 11.0 cents, respectively.

It is to be remembered, that we have already recorded costs up to 1 cent per pound in our diagram. So when plotting the cost curves according to the above mentioned figures we have to start from the 1 cent line as a basis. It is interesting to note incidentally how different these curves are from the curves of beam dyeing.

Winding and Warping Costs. These may be dealt with in the same way as in the case of the beam dyeing process. Allowances for changing beams, creeling and, in this case, for changing from one pattern to another will occur more frequently and amount to a higher figure. If a mill processes long warps only, these allowances will still form a low percentage and they may be brought in as an average figure per pound, just as we did in the case of the beam dyeing process. But if short warps occur as well, it is better to keep these allowances out of the diagram and add them up to the aggregate cost figure, as we will do in one of the instances at the conclusion of this article.

The way in which the curves for the winding and warping costs have been constructed, has been fully explained under the beam dyeing process, and it may suffice here to refer to this explanation.

Waste. When the dyeing is done in packages, it is not such a simple matter to ascertain the amount of material which is wasted. It would be quite easy to note the weight of yarn which is used for making packages to be dyed. But keeping a record of the output is far less simple. For it must not be forgotten that considerable amounts of yarn are constantly stored away as remnants, whereas at the same time other remnants will be brought into the warping room to be used. Keeping records of these remnants, as they go in and out, will prove both laborious and fruitless. For mistakes are bound to occur and hence totally misleading figures would result.

There is, moreover, the fact, that cotton decreases in weight under the influence of most dyeing processes. This decrease would be put down as waste, whereas it is a decrease in weight only and by no means a decrease in length.

The best practical plan is to note the invoiced weight that is used for making dyeing packages and to weigh the packages as they leave the winding department. The difference is the amount of waste both visible and invisible that has originated in the winding process. This will prove to be the bulk of the waste. The warping waste is much less important and we are quite justified in taking the waste that is brought in by the warpers to represent the totality of the actual waste.

It should not be forgotten, that the dyeing department may succeed as well in making some waste by smothering a package or two between the hydro-extractor. This will not amount to much, but it should be recorded nonetheless. If we now add up the waste from the winding, the warping and the dyeing, we get an accurate figure as far as practical possibilities go.

It will have been noted that the waste from the warping and the dyeing is colored waste. This fetches a lower price and hence the cost of waste is slightly enhanced. This influence is infinitely small as the bulk of the waste, viz. the winder's waste, is still produced in the grey state. We may allow for it by applying a slightly higher waste percentage or we may leave it altogether out of the question.

The waste lines have been constructed in the way explained under the beam dyeing process.

The other diagrams may easily be elaborated now that the general method has been explained. For warp purposes the diagram for cop-dyeing has to be constructed as well. For in many mills warp yarn is never dyed in the cop, but cases will occur, when cop-dyeing gives decided advantages over package- and beam-dyeing.

The diagrams for weft dyeing must be available as well, for the method in which the warp is processed may affect the size of the batches and as a consequence the processing cost of the weft. In fact, it may be the latter which decides us on a certain way of processing the warp.

Graphic Comparison. When all the diagrams are ready, we can use them daily to find out the most economical process for every individual case. We illustrate this by means of a couple of instances.

First Instance. Suppose a warp of the following description has to be made:

Number of ends: 3,000.
Count of yarn: 28s.
Color: Sulfur brown throughout.
Total weight: 180 pounds.

The weft is supposed to be grey cotton and therefore does not enter into the question.

a. Beam Dyeing. If this warp is to be dyed in beams and a 600 ends warper is available, we have to make 5 beams of 600 ends each, having an individual weight of 36 pounds. We find in Fig. 1, that the "Cost of the Dyeing Process" according to Curve No. 3 for 36 pounds per beam is 4 cents per pound. Starting from the 4 cents point, we follow up the ascending line to the left till it intersects with the vertical for 28s. From this point we draw (or imagine drawing) a horizontal line, which we will find intersects the axis at 7.2 cents. Hence the cost of dyeing, winding and warping together is 7.2 cents per pound.

Now, if the yarn buying department informs us, that the waste cost for 28s yarn at the present moment is 20 cents per pound of waste, we see from the diagram that to 7 cents would have to be added 0.6 cent. Consequently 7.2 cents will become 7.2 + 0.6 = 7.8 cents per pound.

b. Package Dyeing. Supposing our dyeing machine permits of dyeing 180 pounds in one batch, the "Cost of Dyeing Process" according to Fig. 2 would be 2.5 cents per pound. The ascending line to the left which starts from the 2 cents point intersects the 28s vertical at 5.6 cents. Correspondingly for 2.5 cents we are bound to find 5.6 + 0.5 = 6.1 cents per pound.

With the waste cost at 20 cents per pound of waste the ascending lines to the right show us that 6 cents is increased to 6.7 cents on account of the waste. Hence 6.1 cents will work out at 6.8 cents.

Concluding we find, that package dyeing works out at 6.8 cents per pound against 7.2 cents for beam dyeing. Consequently package dyeing is cheaper in this case providing no rewinding costs above the normal are necessary.

Second Instance. Just to show how utterly impossible it is, to give hard and fast rules in this matter, we shall consider a case where everything is exactly the same as in the previous instance, with only the pattern differing. So, let us suppose we have to make a warp as follows:

Number of ends: 3,000.
Count of yarn: 28s.
Color: 500 ends sulfur brown, 2,500 ends grey (undyed).
Total weight: 180 pounds.

a. Beam Dyeing. In this case we will have to make 6 beams of which 1 has to be dyed and 5 have to remain undyed. The weight of each beam will be 30 pounds.

We will find that the "Cost of Dyeing Process" in Fig. 1, shows a figure of 4.8 cents per pound which is carried up by winding and warping to 8 cents. If the cost of waste is 20 cents per pound this brings the total cost to 8.6 cents per pound.

For the grey beams there is no cost of dyeing. The cost of winding and warping is 3.2 ends per pound which is increased by the waste to 3.8 cents per pound.

So we have to process

30 lbs. at 8.6 cents	= $2.58
and 150 lbs. at 3.8 cents	= $5.70
Grand total	$8.28

b. Package Dyeing. When the dyeing is done in package form we would have to dye one batch of 30 pounds. The "Cost of Dyeing Process" according to Fig. 2 would amount to 8.3 cents, and it would be increased by winding and warping to 11.9 cents and by the waste cost to 12.6 cents.

For the remaining 150 pounds there is no "Cost of Dyeing Process," while the cost of winding and warping is 3.6 cents which is carried up by the waste to 4.3 cents.

We may assume that there is a sufficient number of grey packages available, so that for these no rewinding is required. As for the colored packages, however, we must be prepared to find the number insufficient and as a consequence more than the normal amount of rewinding will be required. This is one of the cases, where it is desirable to make a special estimate of the extra cost of rewinding involved. If this amounts to $0.80 we will note it down as an extra item in our calculation. Thus we have to process

30 lbs. at 11.9 cents	=	$3.57
150 lbs. at 4.3 cents	=	$6.45
Extra cost for rewinding		$0.80
Special allowance for creeling		$0.25
Grand total		$11.07

Concluding we find that in this instance beam dyeing is to be preferred by far.

We have so far elaborated the diagrams for beam dyeing and package dyeing for warp purposes only. But this will suffice to show how it is done generally. Diagrams for the other four processes may be obtained along similar lines. Once they are ready these diagrams will be found an everyday help in plotting out the most economical process for every individual case.

NEW PATENTS

(*Abstracted by S. O. C. M. A.*)

Water-Insoluble Azo-Dyestuffs and Fiber Dyed Therewith. (Obtainable by combining a diazo-, tetrazo- or diazoazo-compound which does not contain any sulfonic acid or carboxylic acid group with a 2'3'-hydroxynaphthoyl-2-amino-6-alkoxy-naphthalene, either in substance, or on the fiber; when produced on the fiber yield dyeings varying from red to blue to black shades distinguished by good fastness properties, particularly to light.) Leopold Laska and Arthur Zitscher, Offenbach-on-the-Main, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,934,807, Nov. 14, 1933.

(Continued on page 81)

Technical Notes from Foreign Sources

Analysis of Sodium Phosphate

Leo Polesie—Monats. f. Textile-Ind. 47, 181 (1932)—The sodium phosphate generally employed for various purposes in the textile industry is usually the "ordinary" or disodium phosphate, which frequently contains some teritary or trisodium phosphate, which does not necessarily possess the same properties as the more common salt. Sodium phosphate is used, for example, for the fixing of substantive dyestuffs in dyeing and printing, and as a stabilizer in hydrogen peroxide bleaching, in which case the general action is the same with each of the phosphates mentioned, and a determination of the phosphoric anhydride content, by the usual methods, is generally sufficient. But perhaps the chief use of phosphate in textile work is as the precipitating agent in the tin-weighting of silk. And here the form in which it is present is important, for the tertiary salt hydrolyzes almost completely when dissolved, giving the equivalent of the disoduim salt and sodium hydroxide, which latter exerts a two-fold harmful effect in the process—precipitation of stannic hydroxide, at least, where only stannic phosphate should be formed, and also probably some damage to the silk itself, in case the phosphate in question should be present in excessive amount, which probably would be the case, since the "tinned" silk, after squeezing, is passed into the phosphate bath. Even without the latter danger existing, it may be supposed that a silk weighted with stannic phosphate containing variable amounts of stannic hydroxide might give trouble in dyeing.

The method employed for the analysis of such a mixed phosphate (i.e., the disodium phosphate contaminated with the trisodium salt) has mostly been the one devised by Heermann, in which the sale in solution is first titrated with HCl and phenol-phthalein, the amount of acid used giving the content of the disodium salt, the equation being

$$Na_3PO_4 + HCl = Na_2HPO_4 + NaCl$$

The titration then being continued, with addition of methyl orange as indicator, would involve the equation.

$$Na_2HPO_4 + HCl = NaH_2PO_4 + NaCl$$

This method, however, does not regard the strong dissociation of the disodium salt, so that the value of the trisodium salt is always too high. The difficulty is easily avoided by addition of sodium nitrate or sodium chloride, either of which largely suppresses the hydrolysis, if added in sufficient amount. The results are still not exact, but much more nearly so than before.

There is an exact method known, which depends upon the determination of the free hydroxyl ions in the phosphate solution; methyl acetate is added to the solution, and the velocity of saponification of the ester measured (Nernst, Theoretische Chemie. 1906 p. 607, and Zeitsch. f. Phys. Chem. 1893, 12, p. 167). But such methods cannot properly be called analytic, without unfairness to our definitions.

It should be mentioned, also, that occasionally dealers offer an anhydrous sodium phosphate. In the preparation of this, by calcination of the crystalline form, it can happen that pyrophosphate is formed, a substance very dangerous in silk weighting. Dvorzak and Reich-Rohrwig have devised a method of determination for this substance, present in a sample of the disodium salt, using uranyl acetate as titrating agent.

Some Naphtol AS Colors

Georg Rudolph—Monats. f. Textil-Ind. 47, 183 (1932)—A practical paper on the use of the recent Naphtol AS-GR and AS-SR, also AS-LB. Extract procedures are given clearly and concisely.

Validity of the Principle of Ordination and Technique of Color Measurement According to Ostwald

Dr. A. Klughardt and Manfred Richter—Farben-Chemiker 3, 336 (1932)—The second part of the paper. It is of the nature of a semi-theoretical discussion of the subject, and accordingly contains a good many mathematical expressions of apparently rigid applicability. But our personal feeling about the matter is best expressed (perhaps not intentionally) in a few words of the author, midway in the paper and not emphasized; "Therefore, if one possesses a psychological triad (of colors), one is in a position to establish calculative formulae. It is inherent in the nature of the subject, that these formulae cannot be derived exactly in a simple way (dassdiesen Formeln nicht gerade einfach ausfallen)".

Without questioning the possible validity of Ostwald's theory, we should like to see some handling of it which would not assume, *a priori*, that it must be valid, and that every effort must be made to bring everything known into harmony with it. We have seen little done from that standpoint, as yet.

(Note:—the first section of the above paper, ibid. 3, 205 (1932), came into our hands after a study of the above section. Its purport is merely introductory to the matter of this present part.)

Printing Colors for Financial and Commercial Paper

K. Hazura—Farben-Chemiker 3, 94 (1932)—Two classes of paper are spoken of in this article; first, that used for banknotes and governmental notes (what we in this country commonly call "bills"); second, financial paper of the nature of bonds, etc.; third, such documents as bank checks. The author declines, for obvious reasons, to deal with colors employed or employable for paper of the first class, but does take up in some detail the matter

as far as it relates to paper of the other two classes. Some of the points which he deals with are as follows:—

Paper (we now use the term in the general, official sense, as meaning printed documents involving obligation) of the second class must be assured against imitation by hand or photomechanically; each document must be reproduced as exactly as possible in conformity with the standard; and should possess the greatest possible durability in handling, and stability in storage. Of the third class, the paper must involve assurance against the possibility of alteration ("raising" of a bank check, for example). The colors used in printing such documents must clearly be specially selected for the purpose. In addition, the colors must possess certain varying characteristics, according to the method employed for printing the paper. The Bourses of Berlin and Munich have established a standard for the printing of such papers, which limits the method to copper-plate engraving and printing by type. All other methods of reproduction, even lithography and offset printing, are expressly mentioned as unsuitable. The Berlin Bourse has recently announced that it will recognize no paper except such as is produced by the two methods favored—which the author believes is going too far, since in his wide experience, both as a producer of financial paper and as an official of the Bourse of Vienna, he has examined much very finely executed paper produced by the lithographic and offset methods. In this article, he therefore takes up the problem as presented by all four methods of reproduction.

a-Copperplate printing.—A general but exhaustive description of this method is given, which is interesting, but has nothing to do with organic colors. As to the colors themselves, employed as constituents in the printing inks, the mineral colors are of course most used. The author adds, however, his experience (he began work in the Vienna Bank-Note printery in 1891) with the use of organic dyestuffs; both those worked up in the form of lakes (alizarine and basic colors, and others which will form lakes) upon every conceivable substratum; the Lithol series, and most recently the Indanthrene series, of dyestuffs. The last group is unfortunately too expensive to use. Could such dyestuffs be employed at a reasonable cost, they would be most economical in use, as the part wasted in the printing could easily be recovered by suitable treatment in baths, whereas, with the other classes of colors, the part which actually enters the depression of the engraved plate is the only portion of the ink used, and all the rest which has been applied to the plate, which is by far the greater part, is wiped off before the impression is taken from the plate, and is irrecoverable.

We have as yet not seen the continuation of the paper.

Preservation of Adhesives

Dr. H. Stadlinger—Farben-Chemiker 3, 180 (1932)—This is the second section of the paper, dealing with the effect of various definitely mentioned preservatives against mould-formation.

Topic 3, the importance of the reaction of a given preservative, mentions a few excellent preservative substances which are of themselves so insoluble in water (o-phenyl-phenol, p-hydroxybenzoic esters) that they must be employed in the much more soluble form of their sodium salts. One, p-chlor-m-cresol, already recognized by the industry as valuable, must for the same reason be employed in alcoholic solution, if not as its sodium salt (though it may be used in aqueous suspension if effectively emulsified). If the substance in question can be gotten into solution as the sodium salt only by use of caustic soda (which is always the case if the substance is of phenolic nature, except with nitrated phenols, which do not seem to be considered), the danger of addition of an excess of caustic may require either the use of the substance rather in alcoholic solution, without use of alkali at all. (It should further be noted that, in the case of a phenolic substance in the form of the sodium salt, formed by solution of the substance in exactly its equivalent of caustic solution, and careful evaporation to dryness, such a dry preparation of the alkali salt would hardly endure the exposure to ordinary air which would be involved in repeated openings and closings of the container, in the withdrawal of portions for use. Some of such phenolates, indeed, in the dry state, are spontaneously inflammable, and all which are known are characteristically hygroscopic. If not absolutely dry, they are still more liable to rapid decomposition by the unavoidable exposure to ordinary air, either from carbonation, or oxidation, or both.) Chlor-xylenol (sol. 0.04/100) and chlor-thymol (sol. 0.03/100) are usable either as neutral sodium salts, or in alcoholic solution. Of course, the introduction of much alcohol into a gelatine, etc., will unfavorably affect its physical properties as an adhesive.

Oddly enough, the older preservatives, as boric, salicylic, and benzoic acids, when in the form of their alkali salts, practically lose their power of inhibiting mould-formation.

Sulfur dioxide has long been utilized in glue and gelatine manufacture. Its presence, however, must be guarded against when the material is to be used upon fibers or dyeings which are at all sensitive to it.

Topic 4, the influence of the preservative upon adhesiveness, and consistence of the adhesive, mentions the effect of caustic alkali (its danger is referred to above), in breaking down the glutin into simpler, less adhesive derivatives or degradation products; and of formaldehyde, as such or as paraformaldehyde or hexemethylene-tetramine, which coagulates and hardens the albumenoids present, thereby removing them from the field of active glutinous material; in either case, the adhesiveness of the material suffering.

The same is true of vegetable adhesives (gum arabic, for example). Complaint has been made of the pastes or mucilages becoming much thinner by the use of the above preservatives.

Topic 5, the danger of the preservative agent splitting off harmful constituents, briefly describes the use of p-

toulene-sulfon-chloramide, as a preservative for vegetable mucilages, and notes that cases have been met with in which the chlorine was partly split out, on standing, as free chlorine, not only imparting a distinct and disagreeable odor of chlorine to the material, but also, naturally, attacking the glutinous material, and lowering its adhesive property and viscosity. This might have been expected from the fact that the chloramide, so much used in bleaching, is also used to desize textile material—to remove starch finishes from the fiber. Sodium fluoride, much used in America as a preservative for casein cold-sizings, is dangerous when carelessly used for casein liquors which have been treated with lime to ripen the casein, as the fluoride reacts with the lime to form insoluble calcium fluoride, and free caustic soda, the first product attacking the apparatus, and the latter attacking and breaking down the casein.

Removal of Tannic Acid Spots

Deutscher Faerber-Ztg. 68, 144 (1932)—The deep brown color of tannin and pyrogallol spots is to be ascribed to the fact that such substances, when in contact with the air, especially when wet, pass over into deeply colored oxidation products. This is particularly so when alkali is present, (cf. the use of pyrogallol as a photographic developer), which might easily occur from contact with street dust or mud. The removal of such spots can be accomplished in either of two ways:—

a—the tannin of the spot may be converted to the iron salt, which is soluble in water; by spotting with a solution ferrous sulfate or chloride. Such iron salts are deeply colored, black, in fact (cf. ordinary inks), but can be dissolved out by dilute hydrochloric acid. If the spot in question becomes black by treatment with an iron salt, it should at once be treated with lukewarm acetic acid, to which a little HCl has been added. The solution of the black iron tannate by this medium usually requires several minutes. As a rule, a yellow spot remains, due more or less to iron compounds; and so this residual spot can then be removed by spotting with a solution of tartaric acid, followed by washing.

b—since the comparatively pale tannin spots have become darker colored by oxidation, they should be removable by the reverse reaction, by reduction. They may be treated with a solution of hydrosulfite, Burmol, etc. The spot is thus reconverted to the original pale color, and can then be removed by careful washing or sponging.

It is added, from another source, as a comment, that procedure "a" would seem to be at least "very surprising" to a professional cleanser. Quite apart from the fact that in fifty out of a hundred cases the spots would only be made worse by such treatment, it should be evident to anyone that, if it is possible to remove the comparatively insoluble blue-black iron tannate spots, it should be equally possible to remove the much lighter-colored tannin spots directly, without making them worse before attempting to remove them. The process to be employed is simply that of removing an inkstain, the substance of which is the same compound in question. The tannin is dissolved out as completely as possible with ether or alcohol, and the residual color, if any, then removed by treatment with a weak reducing or oxidizing agent, hydrosulfite, Burmol, hydrogen peroxide, potassium permanganate, etc. The iron spots remaining, if any, can then be easily removed by treatment with a solution of tartaric, or, better, oxalic acid. If the spot were capable of being removed in the visible way with hydrochloric or acetic acids (removal of the iron component from the tannate), the tannic acid set free might still remain, since several of the compounds still classified as "tannin" are rendered temporarily insoluble by strong acids; and so, under appropriate conditions, the original spot might sometime later reappear—all this, apart from the question of any damage resulting to the fabric or dyeing through use of acids of the kind mentioned. A simple, light-toned tannin spot is much more easily to be removed than the deeper spot produced by treating it with an iron salt. Such a procedure serves well for the identification of a spot as a tannin spot,—for its identification:—but not as a step in its removal.

The second method works well in practice, but the reagent used should be very weak, in order to minimize its possible effect upon the dyeing, if such be present.

Unlevel Dyeing of Viscose

Deutscher Faerber-Ztg. 68, 64 (1932).—Upon dyeing up a large lot of viscose with direct dyestuffs, a certain dyehouse obtained colortones surprisingly different from those gotten with earlier lots of presumably the same fiber. The management made complaint to the dyestuff firm, from which the dyestuffs had been purchased, of having sent them adulterated products, since in no other way could their divergent results be explained. Upon investigation, it was found that the discordant results complained of were obtained only when soda-ash, in quantities usually employed in the application of direct dyestuffs, were a component of the bath, soda-ash, though not usually employed in dyeing viscose, being used apparently because of its general employment in applying direct colors to cotton. Since the same phenomenon of abnormal colortones had been observed in dyeing certain very much soiled lots of cotton with direct colors in the presence of soda-ash, it appeared very probably that the observed abnormal colorings might be ascribed to a partial reduction of the dyestuffs, the alkali present either causing or promoting the activity of the reducing agent present. In the fore-lying case, it appeared probable (since there could be present no naturally-occurring reducing agent) that some residual sulfur from the manufacture of the viscose must have been allowed to remain in the fiber, in such physical condition that it was converted by the hot, aqueous alkali of the dyebath into soluble sulfides, which had partially reduced the dyestuffs and altered their true tone. It was found that lots of viscose which had been desulfurized as usual in a bath of sodium sulfide and then well washed, gave on subsequent

dyeing tones of proper color and depth, whether soda-ash was or was not present. Quantitative analysis confirmed the presence of sulfur in the viscose under suspicion. In similar cases it is therefore to be recommended, that such viscose be treated in a bath of 15 g. of sodium sulfide per liter, at about 70° C., until a sample dyes properly in a bath containing soda-ash. Of course, if the dyestuffs used do not call for the presence of sodium carbonate in the bath, this complete removal of the sulfur is not necessary, as the presence of sulfur alone should cause no trouble.

Dyeing of Animal-Fiber Weaves with Leuco-Ester Salts of Vat Dyestuffs in Alkaline Baths

Monats. f. Textil-Ind. 47, 163 (1932).—The following forms the substance of D. R.—P. No. 539,468, taken out by the I.G. Farben-Ind. A.-G.:

The method practiced up to the present, for applying the leuco-ester salts of vat dyestuffs to the fiber, has been to employ an acid medium and an elevated temperature, the impregnation of the fiber being followed by oxidation. British Patent No. 260,638 mentions the employment of an alkaline medium. The present process covers the application of the leuco-ester salts to the fiber in an alkaline medium, by adding reducing agents to the bath; the subsequent necessary oxidation can be carried out in any of the vats already customary. In alkaline reaction, it is not necessary to raise the temperature of the bath in order to favor absorption, as the liquor is smoothly absorbed at the ordinary temperature.

There are several advantages inherent in this new method; principally, perhaps, as a consequence of the lower temperature involved. For example, by using suitable combinations, mixed tones can be easily produced, which has heretofore proved practically impossible. Reserves containing a base of fatty, waxy, or similar nature can be applied, without the previously-existing certainty that these would melt and run in the hot bath. Straightforward Batik effects are now possible. The new method appears to work well upon animal fibers or upon mixed weaves containing such fibers, as well as upon cellulose, etc.

Nine examples are given of the various methods of application. All except the last three involve the use of wax or fat reserves upon woven goods.

Example 1 describes the dyeing of woolen cloth, printed with a wax reserve as for ordinary Batik. The bath consists (on the liter basis) of

10 g. of the leuco-ester salt of 5-7-6′-trichlor-indigo, pasted up with
950 cc. of warm water
10 cc. ethylene thio-diglycol
10 g. sodium benzyl-sulfanilate
10 g. potassium carbonate
10 g. formaldehyde sulfoxylate (or hydrosulfite)

After treatment for about one hour in this bath in the cold, the goods are washed, and the dyestuff developed in a bath containing 20 g. potassium persulfate and 20 ccs. of conc. sulfuric acid per liter, at about 35° C., followed by washing and drying. The wax reserve is then removed in any of the usual ways (benzine, benzene, etc.) and for final finishing soaped warm and washed. In this way, white effects upon a violet ground are produced.

Example 2—the goods are dyed as given in Example 1 (including removal of the wax resist) and then reprinted as desired with a wax reserve, then redyed in a bath made up as in Example 1, only containing as its dyestuff the derivative prepared according to the Example 1 of German Patent No. 412,053, at 10 g. per liter; dyeing, oxidation, etc., as before. After removal of the wax reserve, white and yellow effects are obtained upon a violet ground and upon the mixed tone of the violet with yellow.

Example 3—woolen or silk, etc., weaves are predyed in light to medium tones, as, for example, with an acid or substantive dyestuff suitable for wool or silk; a design in a wax reserve is printed upon the dyed goods, which are then dyed similarly to Example 1. By addition of hydrosulfite to the second dyebath, if dischargeable dyestuffs were used for the predyeing, it is possible to obtain much more brilliant tone-schemes, since, in place of the mixed tones obtained by union of the two dye-tones, the pure colortone of the dyestuff used for the over-dyeing will be gotten.

Example 4—woolen, silk, or similar goods are printed with wax-reserves, and then dyed as in Example 1, employing the leuco-ester salt of 5-5′-diethoxy-thio-indigo, and in this way are obtained white patterns upon an orange ground. After the wax reserve has been removed, the goods are over-dyed with a suitable acid or other wool dyestuff, thus forming a design of the color of the dyestuff used for over-dyeing, upon a ground of a mixed tone, whose nature will be determined by that of the dyestuff used for the over-dyeing.

Example 5—deals with the printing of a wax-reserve upon silk, weighted or unweighted, the subsequent dyeing, taking place as in Example 1, and developed in a bath containing 1-2 g. of potassium chromate and 10 cc. of conc. sulfuric acid per liter. Removal of reserve, etc., as before.

Example 6—bleached woolen goods, or weighted or unweighted silk, are printed (on a machine with deeply engraved rolls capable of being heated during the printing) with a reserve of the following general composition:

50 g. beeswax
650 g. colophony
30 g. spermaceti
15 g. melted mutton tallow
25 g. paraffine
230 g. oil of turpentine

After printing, the goods are dyed as in Example 1, rinsed, and developed, well washed, dried, and the reserve removed in any suitable manner.

Example 7—ground dyeing—the goods are dyed as in Example 1, in the cold, in any ordinary dyeing machine, jig, etc., and oxidized as before.

Example 8—spun or woven material (unweighted or weighted silk or chlored wool) the latter unprinted or printed with a wax reserve, are dyed in a bath of about the following composition:

10 g. of the leuco-ester salt of 6-6'-diethoxy-thio-indigo
10 g. formaldehyde sulfoxylate
10-20 g. triethanolamine
960 g. water

as before described. The dyestuff is then developed either as in Example 1, with potassuim persulfate, or with potassium chromate and sulfuric acid, as in Example 5.

Example 9—the materials mentioned in Example 8 are dyed in a bath such as the following:

5 g. of the leuco-ester salt of 5-7-6'-trichlor-indigo
955 g. water
10 g. formaldehyde sulfoxylate
10-20 g. triethanolamnie
10 g. sodium nitrite

All details as in the previous cases.

Indigoid Vat Dyestuffs

German Patent No. 469,343 (8/XII/'28)—*I. G. Farben-Ind. A.-G.*—German Patent No. 273,536 describes the production of indigoid dyestuffs by condensation of the a-derivatives of nuclearly substituted halogenated 2-3-naphthisatines with a-naphthol, a-anthrol, etc., and such secondary components commonly used for indigoid syntheses. A-Naphthol halogenated in the 4-position has also been used. The products thus obtained are dark-blue to greenish-blue.

The present patent (one example) retains the use of the reactive nuclear-halogenated 2-3-naphthisatines, but employs for the other component the mono-ethers of 1-4-naphthyhydroquinone, or derivatives not substituted in the ortho position to the free hydroxyl group. The products are pure green dyestuffs of great purity and fastness.

Vat Dyestuffs

German Patent No. 466,103 (I/X/'28)—*I. G. Farben-Ind. A.-G.*—An old reaction, the condensation of an ortho-dicarbonic acid with an orthodiamine is involved. The general procedure is extended to involve the "ortho" dicarbonic acids obtained by oxidation of the closed side-chain of 6-nitro-5-aroyl-ace-naphthene and its substitution products, or the anhydrides of such acids. The one example cites a product violet colored in substance, giving a red vat dyeing cotton red, the dyeings on exposure to the air becoming gray.

NEW PATENTS

(Continued from page 76)

Monoazo-Dyestuffs and Their Production. (Consisting in coupling diazotized 2-amino-diphenylether-4-sulphonic acid-(N)-ethylanilide with paratoluenesulfo-1-amino-8-hydroxynaphthalene-3; 6-disulfonic acid.) Bernhard Richard, Basel, Switzerland, assignors to firm J. R. Geigy S.A., Basel, Switzerland, No. 1,936,266, Nov. 21, 1933.

Metalliferous Azo-Dyestuffs and Process of Making Same. (May be use for dyeing materials of any kind, such as wool, silk, cotton, leather, artificial silk derived from regenerated cellulose, cellulose ester and ethers, lacquers made from a cellulose basis and a natural or artificial resin basis; or as pigments or in printing; the colors are of fast rose to red to violet to blue tints.) Fritz Straub, Basel, and Walter Hanhart, Riehen, near Basel, Switzerland, assignors to the firm of Society of Chemical Industry in Basle, Basel, Switzerland, No. 1,936,276, Nov. 21, 1933.

Metalliferous Disazo-Dyestuffs and Process of Making Same. (For dyeing materials of any kind, such as cotton, wool, loaded or non-loaded silk, leather, artificial silk from regenerated cellulose basis and a natural or artificial resin basis; or as pigments or in printing; dyeings are of very fast orange to violet to blue to grey tints.) Fritz Straub and Walter Hanhart, Riehen, near Basel, Switzerland, assignors to the firm of Society of Chemical Industry in Basle, Basel, Switzerland, No. 1,936,277, Nov. 21, 1933.

Acid Dyestuff of the Anthraquinone Series. (Obtained by causing 1-amino-4-halogenanthraquinone-2-sulfonic acid or a salt thereof, such as an alkali metal salt, to react with a meta- or para-aminoaryl-alkyl-sulfone; dye wool clear blue tints of good fastness properties.) Karl Zahn and Heinrich Koch, Frankfort-on-the-Main-Hochst, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,935,929, Nov. 21, 1933.

Halogenated 4.5.8.9-Dibenzpyrene-3.10-Quinones and Process of Preparing Them. (Vat colors dyeing cotton red tints of good fastness.) Georg Kraenlein and Heinrich Bollmann, Frankfort-on-the-Main-Hochst, and Hans Becker, Hofheim in Taunus, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,935,720, Nov. 21, 1933.

Manufacture of Nitrogenous Compounds Derived from Perylene-Quinone. (More specifically, an aminoperylene-3.10-quinone, which comprises heating perylene-3.10-quinone with hydroxylamine in the presence of concentrated sulfuric acid and ferrous sulfate; dye cotton brown to grey shades.) Max Albert Kunz, Mannheim, and Karl Koeberle, Ludwigshafen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,935,721, Nov. 21 1933.

Production of Vat Dyestuffs of the Anthraquinone Acridine Series and the Products Thereof. (More specifically, comprises acting on 2'-benzanthronyl-1-amino-4-acetylaminoanthraquinone with an acid condensing agent; dye cotton bluish green to olive shades from blue to violet hydrosulfite vats.) Heinrich Neresheimer, Ludwigshafen-on-the-Rhine, Ger., assignor to General Aniline Works, Inc., N. Y., N. Y., No. 1,935,724, Nov. 21, 1933.

Process for the Preparation of Azinic Dyes. (The disymmetric phenyl-imino-N-phenyl-dinaphthazine resulting from the reaction of aniline on disymmetric phenyl-imino-dinaphthoxazine.) Robert Lantz, Paris, and Andre Wahl, Enghein, France, assignors of one-half to Societe Anonyme Des Matieres Colorantes & Produits Chimiques De Saint-Denis, Paris, France, No. 1,935,849, Nov. 21, 1933.

Method of and Means for Dyeing Easter Eggs. Benjamin D. Augenblick, Springfield Gardens, N. Y., assignor to Fred Fear & Co., Brooklyn, N. Y., No. 1,935,901, Nov. 21, 1933.

Production of Green Sulfur Dyes. (Comprises reacting a p-amino-phenol hydrochloride, an arylaminonaphthalene sulfonic acid, and hydrochlorite, isolating the indophenol and treating in the usual manner.) Raymond W. Hess and Maurice Henry Fleysher, Buffalo, N. Y., assignors to National Aniline & Chemical Co., Inc., N. Y., N. Y., No. 1,938,963, Dec. 12, 1933.

Polyazo Dyestuffs. (More specifically, comprises coupling oxalyl-p-phenylenediamine-sulfonic acid with a tetrakisazo compound obtained by coupling 5.5'-dihydroxy-2.2'-dinaphthylamine-7.7'-disulfonic acid with a diazotized aminoazo compound prepared from 1.8-aminonaphthol-3.6-disulfonic acid with 4-methyl-2-amino-1-methoxybenzene; yield violet to blue shades which may be used either as a direct dye or as a developed dye possessing good fastness to light, washing, and to cross dyeing.) Ralph B. Payne, Elma, N. Y., assignor to National Aniline & Chemical Co., Inc., N. Y., N. Y., No. 1,938,976, Dec. 12, 1933.

Vat Dyestuffs of the Anthraquinone Series. (Prepared by causing a metaor para-diphenylbenzene dicarboxylic acid or a functional derivative of these compounds (the halides, for example) to react on alpha-aminoan-throquinone or a substitution product thereof in the presence of a high boiling organic solvent such as chlorobenzene, ortho-dichlorobenzene, nitrobenzene, etc., dyeing cotton from an alkaline hydrosulfite vat yellow to bluish red shades of good fastness properties.) Otto Bayer, Frankfort-on-the-Main, Ger., assignor to General Aniline Wks., Inc., N. Y., N. Y., No. 1,938,993, Dec. 12, 1933.

Fast Blue Sulfur Dyestuffs. (Obtained by heating the quinone vat dyestuffs described in U. S. Patent No. 1,588,384, with alkali metal or ammonim sulfydrates, sulfides or polysulfides in an aqueous or alcoholic solution at atmospheric pressure on the reflux condenser or under elevated pressure in an autoclave; possess excellent fastness to washing and light.) Richard Herz, Frankfort-on-the-Main, Ger., and Wilhelm Hechtenberg, Mainkur, near Frankfort-on-the-Main, Ger., assignors to General Aniline Wks., Inc., N. Y., N. Y., No. 1,939,008, Dec. 12, 1933.

Dibenzoxacarbocyanines and Process of Preparing Them. (A new class of photographic sensitizing dyes.) Leslie G. S. Brooker, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester, N. Y., No. 1,939,201, Dec. 12, 1933.

Ralph E. Hall Honored

The Pittsburgh Section of the American Chemical Society has selected Dr. Ralph E. Hall, Director, Hall Laboratories, Inc., Pittsburgh, Pa., as the recipient of the 1933 (the first) Pittsburgh Award.

This honor, which will be conferred on Dr. Hall at the Sectional meeting on February 15, 1934, has come to him in recognition of his distinguished service to chemistry and humanity, particularly his contributions to the fundamental knowledge of boiler water reactions and their applications to the practical solution of boiler-water problems, his discoveries and technical accomplishments in the beneficiation and conditioning of water for industrial and domestic use, and his developments in the production of chemicals for these purposes.

The Pittsburgh Award is represented by an especially designed plaque on gold, on which the relation of chemistry to industry is symbolized artistically.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED—Plant chemist and rayon processing man with over ten years' practcial experience with leading American and European dyeing and printing organizations (pure weighted silk, rayon, Celanese) has just returned from Europe where he was in charge of rayon processing plant exporting rayon crepes to England, desires position. Write Box 800, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED—Finished Rayons and Cotton Piece Goods Plain or Prints. 35 years' practical experience, can offer with my services a unique method. Only 3 plants U.S.A. Write Henry F. Carr, 148 Milton Street, Brooklyn, N. Y.

WANTED—For brief period services of consulting chemist familiar with the chemical and mechanical problems involved and experienced in Sulphonating Fats and Oils. Write details of experience to Box No. 801, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.